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Industrial Application of Fluidized-Bed Combustion Phase I

Quarterly Technical Progress Report

January 1 — March 31, 1979

October 1979

Prepared for

U.S. Department of Energy

Assistant Secretary for Energy Technology

Division of Fossil Fuel Utilization

Under Contract No. EX-76-C-01-2473

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January 1 — March 31, 1979

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Prepared by
Combustion Engineering, Inc.
Windsor, Connecticut 06095

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U.S. Department of Energy
Assistant Secretary for Energy Technology
Division of Fossil Fuel Utilization
Washington, D.C. 20545
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I. Objective and Scope of Work

A. Objectives

The purpose of this program is to develop a commercial atmospheric, natural circulation, fluidized-bed steam generator designed essentially as a package boiler, i.e., shop assembled and capable of shipment by rail. It must be capable of firing coal while meeting all environmental standards without the use of auxiliary SO₂ removal equipment and be competitive with other methods of coal firing for industrial practice.

B. Scope of Work

The program is divided into two distinct phases. Phase I consists of designing and constructing a Sub-Scale Test Unit. The Unit will contain a 3 x 3 foot fluidized-bed module designed to deliver 2300 lb/hr of steam at 365 psig and 560°F while burning 284 lb/hr of coal along with limestone. Phase I also includes the detail design of the demonstration plant.

Phase II consists of construction, startup and testing of a full size, fluidized-bed (8' x 17'), package boiler as a demonstration plant with a capacity of 50,000 lb/hr steam flow at 365 psig and 560°F while burning 5,000 lb/hr of coal in a limestone bed.

The Sub-Scale Unit will be located at KDL and the Demonstration Plant will be at the Great Lakes Naval Training Center in Illinois.

Phase I will be completed in 2-3/4 years and Phase II in 2-1/4 years with the entire program completed in 5 years which will be July 1, 1981.

All work shall be performed in accordance with two distinct phases as follows:

1. Phase I - Development

This phase consists of all necessary work prior to the construction of the demonstration plant. The objective of this phase is to demonstrate that the fluidized-bed can be operated with natural circulation and provide the necessary experimental data to design the demonstration plant.

Task 1 - Test Program Development

An evaluation of the current state of the art will be made to determine what uncertainties exist in the design of a natural circulation fluidized-bed boiler. Based on this, test data requirements will be established and selection of instrumentation and their location will be established. A total test program including testing schedule, sequence of testing and test procedure will be developed.

The activities of this task include: (1) evaluation of areas of uncertainty; (2) develop test plans for the cold flow model; (3) development of data required and instrumentation; (4) program schedule and testing sequence development; (5) factor requirements of test program into the design of the Sub-Scale Unit.

Task 2 - Sub-Scale Design

Develop the design of the Sub-Scale Test Unit, considering alternative test arrangements to insure maximum flexibility for various tests. Select equipment and develop flow diagrams and arrangement drawings. Based on the unit design developed, design and construct a cold flow test model. Obtain the required permits.

The activities of the task include: (1) establish design criteria; (2) design sub-scale boiler; (3) facility and services design and equipment arrangement; (4) systems design and component selection; (5) design, construction, and testing of cold flow model; (6) update cost estimates and schedules.

Task 3 - Sub-Scale Construction

Accomplish materials and equipment procurement and construct the Sub-Scale Test Unit. Included are construction labor, site preparation, facilities hookup, and performance check-out of the unit.

The activities of this task include: (1) materials and equipment procurement; (2) construction and hookup; (3) performance check-out.

Task 4 - Sub-Scale Testing & Data Analysis

Execute the test program developed in Task 2. Steady-state tests, transient tests, and alternative configuration tests are included.

Analyze data and recommend additional tests. Develop design procedures, parameters, and performance models.

The activities of this task include: (1) execute the test program; (2) data analysis and evaluation; (3) develop fluid-bed models; (4) sub-scale modifications and testing.

Task 5 - Preliminary Design of Demonstration Plant

This task includes the development of a conceptual design of the demonstration plant using the results of Task 4. Alternative configurations, as necessary, will also be developed. A conceptual design of a larger unit for commercial application using the demonstration plant design as a module will also be developed.

The activities of this task include: (1) unit design criteria with heat balance, material balance, flow diagrams and equipment layout; (2) conceptual design of demonstration plant including alternate; (3) conceptual design of larger unit; (4) cost estimate; (5) engineering schedule.

Task 6 - Site and Plant Approvals, Demonstration Plant

Produce the required analysis, assessments, drawings and program for the site in order that the various environmental and OSHA permits and variance may be obtained.

The activities of this task include: (1) plant effluent analysis; (2) site requirements; (3) site and plant approvals; (4) environmental assessment.

Task 7 - Final Design of Demonstration Plant

Develop the final design configuration for the demonstration plant. Equipment selection and detail design drawings will be made. All electrical diagrams, piping diagrams, flow sheets, boiler engineering drawings, engineering site drawings, equipment arrangements and control requirements will be specified. Final costs will be obtained.

The activities of this task include: (1) design configuration selection; (2) equipment selection; (3) system performance analysis; (4) preparation of drawings, specific flow sheets and diagrams; (5) instrumentation and control selection; (6) cost estimates; (7) cost comparison between larger fluidized-bed unit and conventional coal fired unit.

All applicable codes and standards normally followed in routine engineering practices for Industrial Boiler Plants will be used, except where by mutual agreement special codes or specifications must be applied.

Task 8 - Program Support

This task will provide for program support of the demonstration plant through actual testing on the Sub-Scale Unit as required by the results obtained on the demonstration plant.

The activities of this task include: (1) evaluation requirements for actual Sub-Scale Unit tests; (2) develop test program and modify Sub-Scale Unit as necessary; (3) evaluate the test program; (4) data analysis and evaluation; (5) demonstration plant modification design and evaluation.

Task 10 - Cold Flow Model with Slumped Bed Operation

This task is an addition to the contract. The objective of this work is to determine the effects of defluidizing and refluidizing discrete sections of a fluidized-bed.

The activities of this task include: (1) develop test plans; (2) design, construct and test cold flow model; (3) data analysis and evaluation; (4) modify cold flow model and continue testing, as required.

2. Phase II - Construction and Test Operation of Demonstration Plant

Task 1 - Construction

a. General

Provide construction services and engineering support required for the installation, checkout and startup of the shop assembled boiler to be fabricated as the major element of the demonstration facility.

Construction of the demonstration facility will follow a "total job" concept (i.e. all site work from inception to completion). Provisions will be made for site performance to properly integrate the demonstration facility for the production and utilization of steam within the U.S. Naval Station's existing system. Provisions for handling feedstocks and wastes will be included in the contract.

Start-up services will be provided aimed at demonstrating a full operation capability. These shall include but not be limited to:

1. Personnel staffing and training
2. Operating and maintenance procedures and manuals
3. Identification of requirements for spare parts, tools, and test equipment.

Task 2 - Test Program

This task includes a training program that will be conducted to develop the necessary personnel skills required for the safe operation and maintenance program.

A test program for parametric test of the demonstration facility, data acquisition, steady-state and transient tests is planned.

An analysis of test data, evaluation and comparison with developed models, and recommendations for design procedures and standards will be completed.

In addition, the program includes collecting, analyzing and reporting all failures that occur during facility operation and tests.

II. Summary of Progress During January-- March, 1979

In March, 1979, ground was broken for the Fluidized Bed Industrial Boiler Demonstration Plant at the U. S. Navy Training Station, Great Lakes, Illinois. EPA approval of the Prevention of Significant Deterioration report fulfilled the final prerequisite to the start of construction.

During the January-March period, Sub-Scale Unit (SSU) testing provided significant information for the final design of the Demonstration Plant. Design work for the Demo continued apace, along with planning and preparation for operation and testing.

SSU shakedown was completed in January, and about 60% of the planned test matrix was accomplished (Test Series I, J, K, & L).

Attached is the first issuance of the Test Program initial data. This includes Series J, K & L dated January 22, 1979 thru March 23, 1979. Based on the test results, Demo Plant design values were developed for:

- combustion efficiency
- free-board heat release
- in-bed heat transfer coefficients
- elutriation rates

From the SSU operation, indications for the Demo Plant are that the natural circulation rate will be satisfactory, and SO₂ and NO_x emissions will be well within required limits.

Several phases of the Demo Plant design were reviewed or updated, and a number of features were finalized. Heat and Mass Balance, Process Flow Diagrams, and performance design criteria were revised to reflect SSU test results. Bed surface requirements of the boiler were recalculated. Plant systems were simplified by deletion of the combustion air system bypass and the acid wash line. The Performance Assurance Analysis was started.

Preparation for operation include work on inspection and startup procedures, training and test program. Construction work started in March.

A program status review meeting was held at C-E's manufacturing facility located in Chattanooga, Tennessee.

III. Detailed Description of Technical Progress

Work activity in the first quarter of 1979 was in the following major areas:

- Sub-Scale Unit Test and Data Analysis
- Demonstration Plant Site and Plant Approvals
- Demonstration Plant Design
- Demonstration Plant Construction
- Demonstration Plant Test Program Development

Sub-Scale Unit Test and Data Analysis:

Shakedown testing of the Sub-Scale Unit (SSU) was completed in January with Test Series I. The planned test matrix was started at the end of January and continued during February and March. Approximately 60% of the matrix (Test Series J, K and L) was accomplished. Preliminary data reduction has been completed on these tests.

Test results were reviewed with regard to Demonstration Plant design parameters. Design values were developed for:

- combustion efficiency
- freeboard heat release
- in-bed heat transfer coefficients
- elutriation rates

Natural circulation rates in the SSU are acceptable; they are not expected to be of concern in the Demonstration Plant. Sulfur dioxide and nitrogen oxide emissions are both well within the required limits for the Demonstration Plant.

Sub-Scale Test & Data Analysis Forecast of Activities:

Complete the planned test matrix.
Complete the performance analysis.
Begin the preparation of a final task report.

Demonstration Plant Site, and Plant Approvals:

The Federal EPA Region V Office granted final approval to the Prevention of Significant Deterioration (PSD) report. This approval allowed construction to start in March.

Demonstration Plant Site and Plant Approvals Forecast of Activities:

Final approval of the Environmental Impact Assessment (EIA) by DOE is expected during the next quarter.

Final Design of Demonstration Plant:

The following Engineering Specifications were issued in the first quarter of 1979:

New Specifications

- Compressed Air System
- Building Siding and Accessories
- Exterior Hollow Metal Doors, Frames and Accessories
- Interior Metal Doors, Frames and Accessories
- Glass and Glazing
- Gypsum Drywall
- Resilient Tile Flooring
- Emergency Medical Equipment
- Roof Drain System
- Field Painting
- Accident Prevention Signs
- Equipment for CO₂ Inerting System

Revised Specifications

- Air Compressor
- Desiccant Air Dryer
- Site Gate
- Paving and Surfacing
- Building Siding and Accessories
- Metal Roof Deck
- Built-up Bituminous Roofing
- Mortar for Unit Masonry
- Mortar and Grout for Reinforced Masonry
- Sump Pumps

Vendors were selected for:

- Activator for Raw Coal Silo
- Air Filter Equipment for Coal Handling and Preparation System
- Fuel Oil Pump for Ignitors and Coal Drying System
- Ash Systems Hoist

Purchase Orders were requested for:

- Feedwater Valve
- Desuperheater Spray Control Valve
- Ignitor Oil Trip Valve

The following equipment was approved for fabrication:

- Flyash fluidizing air valves
- Feedwater control valve
- Desuperheat spray control valve
- Ignitor oil trip valve
- Cyclone separators
- Vent filters

Updated information was issued for material selection and engineering design of the bed and duct ignitors and their associated fuel and air piping.

A meeting was held with the vendor to discuss arrangement of and controls for a water cooled screw for removal of the bed drain material. As a result, engineering approval was given, and the equipment was released for fabrication. The vendor's drawings for the below grade piping for sewage disposal and water supply were reviewed. The acid wash line was eliminated.

The necessary forms, description, and drawings were submitted to the Federal Aviation Administration for their review regarding obstruction lights on the stack. A process equipment list has been developed, including operating conditions and special design features of all major drawings for Architect/Engineering work.

A brief write-up on Operating Philosophy was prepared. In connection with this, a study was made on the forced draft air system and its effect on operating procedures and F.D. fan requirements. The study indicated that the air bypass system is unnecessary; it was, therefore, deleted. Work on the Performance Assurance Analysis was started.

Heat and Mass Balance and Process Flow Diagrams were revised to reflect changes in schematic arrangement.

SSU test data indicated a potential increase in recycle ash quantity. Three alternate methods were proposed to handle the increased quantity, staying within existing building confines and the established dry ash handling concept. SSU test results were reflected in revised performance design criteria for the demonstration plant. Revised Heat and Mass Balance Data were calculated. Bed surface requirements for the demonstration plant were recalculated.

Storage silo designs were approved for raw coal, prepared coal, limestone, and recycle ash. Explosion venting requirements were established for all dust collecting equipment. Designs were prepared for the ash reinjection surge bins and for a temperature protection system for P.D. blowers.

In the Furnace Safety Supervisory System (FSSS), sketches of the interlocking logic are about 95% complete. The design of the FSSS cabinet was established and cable connectors were selected. The duct ignitor control cabinet and test box were selected. The specification for the analog control system is about 40% complete. The Piping & Instrumentation (P&I) drawings are being updated.

Work has continued on the cost comparison study between pulverized coal (PC) and fluidized bed (FB) fired units. Designs have been established, and cost estimating is underway for pressure parts, fuel and limestone systems, air and flue gas systems, and ash systems. Dust collecting equipment for the PC unit will comprise only a baghouse. The flue gas scrubber specifications were revised to meet the latest EPA requirements. An outline of the comparison study report was prepared.

Final Design of Demonstration Plant Forecast of Activities:

- Issue new and revised Engineering Specifications
- Establish design and operational requirements for fire protection and freeze protection
- Issue a draft report on Performance Assurance Analysis
- Issue a draft report on the cost comparison study

Demonstration Plant Construction:

The sub-contractor, Keno & Sons, initiated site preparation work on March 26, 1979. C-E Construction Services representatives have manned the job and are providing coordination support between the sub-contractor and Combustion Engineering.

A proposed site manpower and organization chart has been prepared. Work has started to identify necessary equipment inspection procedures, startup packages, safety and tagging procedures and the operator training program.

Demonstration Plant Construction Forecast of Activities:

- Complete the equipment inspection procedures
- Complete the safety and tagging procedures
- Continue work on the startup packages
- Continue work on the operator training program
- Initiate work on the plant shakedown procedures

Demonstration Plant Test Program Development:

Work continued to establish locations of test instrumentation and to identify the availability of measurements needed for the test program. P&I diagrams are currently being updated to show this information.

A general test program outline has been formulated. The objectives of the program are to:

- Verify equipment performance and record detailed operational history
- Establish optimum operating conditions and procedures for:
 - . Maximum continuous operation
 - . Sustained partial load operation
 - . Variable load operation
 - . Cyclical operation

Demonstration Plant Test Program Development Forecast of Activities:

Continue development of test program, including detailed procedure for plant shakedown operation, parametric testing and data reduction and analysis.

IV. Conclusions

Sub-Scale Unit shakedown and over half of the test program were successfully completed during this quarter. Results achieved from this operational period provided significant data for the final design of the demonstration plant. See Attachment.

Final approval of the Prevention of Significant Deterioration report was received the week before site preparation was scheduled to begin. Federal EPA review of the report required an extended period of time, much more than originally estimated.

Final design of the demonstration plant has continued to progress towards completion. Engineering specifications are being prepared on the building services. Preparation of arrangement and detail drawings for much of the plant systems is underway.

A cost comparison study between a pulverized coal and fluidized bed fired units has been continued during this period. The results of this work will be issued during the next report period.

The construction of the demonstration plant has begun as scheduled. Site preparation was initiated on March 26, 1979. Combustion Engineering has manned the job and is providing coordination of field activities.

Work continues to develop a comprehensive shakedown and testing program for the demonstration plant. Objectives of the program are (1) verify equipment performance and record detailed operational history and (2) establish optimum operating conditions and procedures for maximum continuous operation, sustained partial load operation, variable load operation and cyclical operation. Testing will be scheduled to support these objectives within the restraints of the activity and program schedule.

AS OF DATE: 3/79

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

DATA RECORDED ON 1 22 79

DATA RECORDED AT 21 32 0

STEADY STATE POINT J-1

BASELINE TEST

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	250.75 LB/HR
LIME FEED RATE (AS FIRED)	75.81 LB/HR
TOTAL DRY AIR FLOW	2951.23 LB/HR
PERCENT OF MCR LOAD	106.02 PRCT
THEOR EXCESS AIR	50.83 PRCT
BED TEMPERATURE	1415.30 DEG F
CA/S MOLE RATIO	2.72
SUPERFICIAL VELOCITY	8.71 FT/SEC
FREEDBOARD VELOCITY	4.69 FT/SEC
ACTIVE BED HEIGHT	29.77 IN
BED PRESSURE GRADIENT	1.46 IN H2O/IN BED
GRID PRESSURE DROP	29.13 IN H2O
BED PRESSURE DROP	43.47 IN H2O
BED TUBES FLOW RATE	24626.39 LB/HR
STEAMING RATE	1264.80 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	45.00 LB/HR
BAGHOUSE SOLIDS	8.00 LB/HR
BED DRAIN SOLIDS	49.00 LB/HR
CYCLONE EFFICIENCY	85.19 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	49.86	841.04	55.26	40.60	14.66
TEST LOOP NO. 2	51.08	865.08	56.64	41.98	14.66
ECONOMIZER	9.29	1005.23	9.45		
SUPERHEATER	16.37	153.03	18.96		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	10.52	.066	9.92	100.	966.

NOX EMISSIONS (AS FIRED)	.31 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.32 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	313.48 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1653.37 PPM
SULFUR RETENTION	5.62 LB S/HR
SULFUR RETENTION	64.02 PRCT
CALCIUM UTILIZATION	23.56 PRCT
COMBUSTION EFFICIENCY	91.27 PRCT

PRELIMINARY SSU DATA ANALYSIS

STEADY STATE RUN J-2
 BASELINE TEST
 FREEMAN COAL
 NO RECYCLE

PROGRAM VERSION: SSU77
 DATA RECORDED ON 1 23 79
 DATA RECORDED AT 0 41 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	250.75 LB/HR
LIME FEED RATE (AS FIRED)	75.81 LB/HR
TOTAL DRY AIR FLOW	2979.70 LB/HR
PERCENT OF MCR LOAD	109.43 PRCT
THEOR EXCESS AIR	43.26 PRCT
BED TEMPERATURE	1442.77 DEG F
CA/S MOLE RATIO	2.50
SUPERFICIAL VELOCITY	8.94 FT/SEC
FREEBOARD VELOCITY	4.84 FT/SEC
ACTIVE BED HEIGHT	35.25 IN
BED PRESSURE GRADIENT	1.06 IN H2O/IN BED
GRID PRESSURE DROP	34.75 IN H2O
BED PRESSURE DROP	37.29 IN H2O
BED TUBES FLOW RATE	24429.79 LB/HR
STEAMING RATE	1354.37 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	45.00 LB/HR
BAGHOUSE SOLIDS	6.00 LB/HR
BED DRAIN SOLIDS	53.00 LB/HR
CYCLONE EFFICIENCY	88.46 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR. FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	48.63	841.10	53.75	38.56	15.19
TEST LOOP NO. 2	50.13	867.03	55.47	40.28	15.19
ECONOMIZER	9.80	1087.71	9.96		
SUPERHEATER	17.73	160.92	20.64		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	9.57	.068	11.15	213.	584.

NOX EMISSIONS (AS FIRED)	.36 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.38 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	334.89 PPM
SO2 EMISSIONS (AT 3PRCT O2)	919.96 PPM
SULFUR RETENTION	7.59 LB S/HR
SULFUR RETENTION	79.70 PRCT
CALCIUM UTILIZATION	31.84 PRCT
COMBUSTION EFFICIENCY	92.66 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN J-3

DATA RECORDED ON 1 23 79

BASELINE TEST

DATA RECORDED AT 3 36 30

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	250.75 LB/HR
LIME FEED RATE (AS FIRED)	76.41 LB/HR
TOTAL DRY AIR FLOW	2623.85 LB/HR
PERCENT OF MCR LOAD	106.29 PRCT
THEOR EXCESS AIR	34.04 PRCT
BED TEMPERATURE	1505.70 DEG F
CA/S MOLE RATIO	2.64
SUPERFICIAL VELOCITY	8.18 FT/SEC
FREEBOARD VELOCITY	4.33 FT/SEC
ACTIVE BED HEIGHT	32.24 IN
BED PRESSURE GRADIENT	1.08 IN H2O/IN BED
GRID PRESSURE DROP	27.23 IN H2O
BED PRESSURE DROP	34.83 IN H2O
BED TUBES FLOW RATE	24623.02 LB/HR
STEAMING RATE	1342.65 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	45.00 LB/HR
BAGHOUSE SOLIDS	6.00 LB/HR
BED DRAIN SOLIDS	46.00 LB/HR
CYCLONE EFFICIENCY	88.46 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.89	854.80	56.46	39.94	16.51
TEST LOOP NO. 2	51.74	871.07	57.43	40.91	16.51
ECONOMIZER	8.98	1070.72	9.12		
SUPERHEATER	16.42	160.42	18.89		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	7.35	.054	13.11	247.	241.

NOX EMISSIONS (AS FIRED)	.38 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.51 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	325.52 PPM
SO2 EMISSIONS (AT 3PRCT O2)	318.14 PPM
SULFUR RETENTION	8.33 LB S/HR
SULFUR RETENTION	92.24 PRCT
CALCIUM UTILIZATION	34.88 PRCT
COMBUSTION EFFICIENCY	94.15 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN J-4

DATA RECORDED ON 1 23 79

MATRIX TEST POINT NO. 82

DATA RECORDED AT 10 8 30

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	184.41 LB/HR
LIME FEED RATE (AS FIRED)	57.77 LB/HR
TOTAL DRY AIR FLOW	1980.17 LB/HR
PERCENT OF MCR LOAD	78.67 PRCT
THEOR EXCESS AIR	30.02 PRCT
BED TEMPERATURE	1404.67 DEG F
CA/S MOLE RATIO	2.59
SUPERFICIAL VELOCITY	5.83 FT/SEC
FREEBOARD VELOCITY	3.03 FT/SEC
ACTIVE BED HEIGHT	34.78 IN
BED PRESSURE GRADIENT	1.01 IN H2O/IN BED
GRID PRESSURE DROP	16.40 IN H2O
BED PRESSURE DROP	35.14 IN H2O
BED TUBES FLOW RATE	24291.14 LB/HR
STEAMING RATE	1006.23 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	25.00 LB/HR
BAGHOUSE SOLIDS	6.50 LB/HR
BED DRAIN SOLIDS	72.00 LB/HR
CYCLONE EFFICIENCY	80.00 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	49.81	887.82	54.98	40.48	14.50
TEST LOOP NO. 2	40.74	904.66	44.09	29.62	14.47
ECONOMIZER	6.73	822.21	6.83		
SUPERHEATER	12.30	128.91	13.99		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	7.13	.148	12.41	166.	1300.

NOX EMISSIONS (AS FIRED)	.26 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.79 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	215.43 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1687.09 PPM
SULFUR RETENTION	4.18 LB S/HR
SULFUR RETENTION	59.71 PRCT
CALCIUM UTILIZATION	23.07 PRCT

COMBUSTION EFFICIENCY	91.94 PRCT
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PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 1 23 79
 DATA RECORDED AT 21 30 0

STEADY STATE POINT J-5
 MATRIX TEST POINT NO. 5
 FREEMAN COAL
 WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	186.68 LB/HR
LIME FEED RATE (AS FIRED)	77.01 LB/HR
TOTAL DRY AIR FLOW	2134.13 LB/HR
PERCENT OF MCR LOAD	79.64 PRCT
THEOR EXCESS AIR	38.15 PRCT
BED TEMPERATURE	1388.83 DEG F
CA/S MOLE RATIO	3.41
SUPERFICIAL VELOCITY	6.22 FT/SEC
FREEBOARD VELOCITY	3.27 FT/SEC
ACTIVE BED HEIGHT	33.06 IN
BED PRESSURE GRADIENT	1.26 IN H2O/IN BED
GRID PRESSURE DROP	14.58 IN H2O
BED PRESSURE DROP	41.79 IN H2O
BED TUBES FLOW RATE	24645.33 LB/HR
STEAMING RATE	1082.09 LB/HR
RECYCLE SOLIDS	193.03 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	8.00 LB/HR
BED DRAIN SOLIDS	49.00 LB/HR
CYCLONE EFFICIENCY	96.04 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	49.59	912.45	54.60	40.39	14.21
TEST LOOP NO. 2	40.69	938.04	43.93	29.74	14.19
ECONOMIZER	7.80	847.94	7.92		
SUPERHEATER	13.47	136.32	15.40		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	8.00	.200	12.00	160.	600.

NOX EMISSIONS (AS FIRED)	.26 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	1.38 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	221.54 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	830.77 PPM
SULFUR RETENTION	5.68 LB S/HR
SULFUR RETENTION	80.09 PRCT
CALCIUM UTILIZATION	23.50 PRCT
COMBUSTION EFFICIENCY	98.10 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE POINT J-6

DATA RECORDED ON 1 24 79

MATRIX TEST POINT NO.8

DATA RECORDED AT 14 17 0

FREEMAN COAL

WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	186.68 LB/HR
LIME FEED RATE (AS FIRED)	78.21 LB/HR
TOTAL DRY AIR FLOW	2296.48 LB/HR
PERCENT OF MCR LOAD	81.37 PRCT
THEOR EXCESS AIR	50.86 PRCT
BED TEMPERATURE	1339.43 DEG F
CA/S MOLE RATIO	3.55
SUPERFICIAL VELOCITY	6.52 FT/SEC
FREEBOARD VELOCITY	3.59 FT/SEC
ACTIVE BED HEIGHT	31.02 IN
BED PRESSURE GRADIENT	1.10 IN H2O/IN BED
GRID PRESSURE DROP	18.30 IN H2O
BED PRESSURE DROP	34.14 IN H2O
BED TUBES FLOW RATE	23941.01 LB/HR
STEAMING RATE	1056.29 LB/HR
RECYCLE SOLIDS	637.66 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	19.50 LB/HR
BED DRAIN SOLIDS	61.00 LB/HR
CYCLONE EFFICIENCY	97.04 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	46.05	987.36	50.09	36.84	13.25
TEST LOOP NO. 2	37.74	979.20	40.43	27.20	13.24
ECONOMIZER	8.22	893.90	8.35		
SUPERHEATER	14.45	131.57	16.80		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	8.91	.187	11.56	135.	1300.

NOX EMISSIONS (AS FIRED)	.24 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	3.17 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	201.10 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1935.08 PPM
SULFUR RETENTION	3.59 LB S/HR
SULFUR RETENTION	52.02 PRCT
CALCIUM UTILIZATION	14.65 PRCT
COMBUSTION EFFICIENCY	96.72 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE POINT J-7
MATRIX TEST POINT NO. 9
FREEMAN COAL
WITH RECYCLE

DATA RECORDED ON 1 24 79
DATA RECORDED AT 22 53 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	232.61 LB/HR
LIME FEED RATE (AS FIRED)	95.05 LB/HR
TOTAL DRY AIR FLOW	2452.00 LB/HR
PERCENT OF MCR LOAD	95.18 PRCT
THEOR EXCESS AIR	34.71 PRCT
BED TEMPERATURE	1413.15 DEG F
CA/S MOLE RATIO	3.65
SUPERFICIAL VELOCITY	7.32 FT/SEC
FREEBOARD VELOCITY	4.02 FT/SEC
ACTIVE BED HEIGHT	36.15 IN
BED PRESSURE GRADIENT	1.05 IN H2O/IN BED
GRID PRESSURE DROP	24.05 IN H2O
BED PRESSURE DROP	37.96 IN H2O
BED TUBES FLOW RATE	24382.30 LB/HR
STEAMING RATE	1322.74 LB/HR
RECYCLE SOLIDS	687.92 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	26.00 LB/HR
BED DRAIN SOLIDS	90.00 LB/HR
CYCLONE EFFICIENCY	96.36 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	47.37	978.79	51.68	37.04	14.64
TEST LOOP NO. 2	38.41	984.79	41.19	26.57	14.62
ECONOMIZER	10.31	1081.42	10.49		
SUPERHEATER	17.17	157.05	19.96		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	6.90	.208	13.19	160.	1000.

NOX EMISSIONS (AS FIRED)	.25 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.21 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	204.29 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1276.82 PPM
SULFUR RETENTION	5.43 LB S/HR
SULFUR RETENTION	66.72 PRCT
CALCIUM UTILIZATION	18.26 PRCT
COMBUSTION EFFICIENCY	95.87 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 1 25 79
 DATA RECORDED AT 10 5 30

STEADY STATE RUN J-8
 MATRIX TEST POINT NO. 10
 FREEMAN COAL
 WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	232.61 LB/HR
LIME FEED RATE (AS FIRED)	95.05 LB/HR
TOTAL DRY AIR FLOW	2528.92 LB/HR
PERCENT OF MCR LOAD	96.70 PRCT
THEOR EXCESS AIR	38.11 PRCT
BED TEMPERATURE	1357.50 DEG F
CA/S MOLE RATIO	3.55
SUPERFICIAL VELOCITY	7.31 FT/SEC
FREEBOARD VELOCITY	4.09 FT/SEC
ACTIVE BED HEIGHT	33.05 IN
BED PRESSURE GRADIENT	1.21 IN H2O/IN BED
GRID PRESSURE DROP	20.66 IN H2O
BED PRESSURE DROP	40.07 IN H2O
BED TUBES FLOW RATE	23847.18 LB/HR
STEAMING RATE	1273.06 LB/HR
RECYCLE SOLIDS	709.74 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	30.00 LB/HR
BED DRAIN SOLIDS	50.00 LB/HR
CYCLONE EFFICIENCY	95.95 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	44.16	945.44	47.99	34.40	13.59
TEST LOOP NO. 2	35.28	944.62	37.68	24.11	13.57
ECONOMIZER	9.65	1070.03	9.80		
SUPERHEATER	16.74	152.23	19.47		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	7.96	.245	12.33	128.	1400.

NOX EMISSIONS (AS FIRED)	.21 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	3.16 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	176.48 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1931.77 PPM
SULFUR RETENTION	4.45 LB S/HR
SULFUR RETENTION	53.13 PRCT
CALCIUM UTILIZATION	14.97 PRCT

COMBUSTION EFFICIENCY	94.90 PRCT
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PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 1 26 79
 DATA RECORDED AT 6 52 55

STEADY STATE RUN J-9
 MATRIX TEST POINT NO. 13
 FREEMAN COAL
 WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	279.10 LB/HR
LIME FEED RATE (AS FIRED)	113.08 LB/HR
TOTAL DRY AIR FLOW	2789.41 LB/HR
PERCENT OF MCR LOAD	116.19 PRCT
THEOR EXCESS AIR	22.92 PRCT
BED TEMPERATURE	1433.33 DEG F
CA/S MOLE RATIO	3.34
SUPERFICIAL VELOCITY	8.37 FT/SEC
FREEBOARD VELOCITY	4.62 FT/SEC
ACTIVE BED HEIGHT	34.88 IN
BED PRESSURE GRADIENT	.90 IN H2O/IN BED
GRID PRESSURE DROP	33.19 IN H2O
BED PRESSURE DROP	31.24 IN H2O
BED TUBES FLOW RATE	24387.20 LB/HR
STEAMING RATE	1533.89 LB/HR
RECYCLE SOLIDS	864.08 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	45.00 LB/HR
BED DRAIN SOLIDS	43.00 LB/HR
CYCLONE EFFICIENCY	95.06 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	47.43	957.45	51.83	36.81	15.02
TEST LOOP NO. 2	39.73	956.84	42.77	27.77	15.00
ECONOMIZER	11.63	1268.29	11.84		
SUPERHEATER	19.83	176.19	23.18		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	6.22	.183	13.68	160.	315.

NOX EMISSIONS (AS FIRED)	.24 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.65 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	194.79 PPM
SO2 EMISSIONS (AT 3PRCT O2)	383.50 PPM
SULFUR RETENTION	9.64 LB S/HR
SULFUR RETENTION	90.88 PRCT
CALCIUM UTILIZATION	27.18 PRCT
COMBUSTION EFFICIENCY	94.67 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE POINT J-10
MATRIX TEST POINT NO. 14
FREEMAN COAL
WITH RECYCLE

DATA RECORDED ON 1 26 79
DATA RECORDED AT 12 47 30

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	279.10 LB/HR
LIME FEED RATE (AS FIRED)	113.08 LB/HR
TOTAL DRY AIR FLOW	2973.46 LB/HR
PERCENT OF MCR LOAD	109.81 PRCT
THEOR EXCESS AIR	38.89 PRCT
BED TEMPERATURE	1391.30 DEG F
CA/S MOLE RATIO	3.44
SUPERFICIAL VELOCITY	8.69 FT/SEC
FREEBOARD VELOCITY	4.84 FT/SEC
ACTIVE BED HEIGHT	36.61 IN
BED PRESSURE GRADIENT	1.07 IN H2O/IN BED
GRID PRESSURE DROP	36.02 IN H2O
BED PRESSURE DROP	39.16 IN H2O
BED TUBES FLOW RATE	24149.58 LB/HR
STEAMING RATE	1540.44 LB/HR
RECYCLE SOLIDS	911.31 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	36.00 LB/HR
BED DRAIN SOLIDS	70.00 LB/HR
CYCLONE EFFICIENCY	96.20 PRCT

. - SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	43.71	978.85	47.36	33.19	14.17
TEST LOOP NO. 2	36.36	979.06	38.85	24.69	14.16
ECONOMIZER	10.52	1169.66	10.69		
SUPERHEATER	19.55	176.91	22.79		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	7.67	.220	12.13	2350.	230.

NOX EMISSIONS (AS FIRED)	3.91 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.53 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	3173.89 PPM
SO2 EMISSIONS (AT 3PRCT O2)	310.64 PPM
SULFUR RETENTION	9.57 LB S/HR
SULFUR RETENTION	92.70 PRCT
CALCIUM UTILIZATION	26.96 PRCT
COMBUSTION EFFICIENCY	93.73 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

DATA RECORDED ON 1 26 79

DATA RECORDED AT 20 31 0

STEADY STATE POINT J-11

MATRIX TEST POINT NO. 14-A

FREEMAN COAL

WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	279.10 LB/HR
LIME FEED RATE (AS FIRED)	113.08 LB/HR
TOTAL DRY AIR FLOW	2448.30 LB/HR
PERCENT OF MCR LOAD	117.55 PRCT
THEOR EXCESS AIR	10.19 PRCT
BED TEMPERATURE	1473.53 DEG F
CA/S MOLE RATIO	3.35
SUPERFICIAL VELOCITY	7.65 FT/SEC
FREEBOARD VELOCITY	4.17 FT/SEC
ACTIVE BED HEIGHT	27.66 IN
BED PRESSURE GRADIENT	.70 IN H2O/IN BED
GRID PRESSURE DROP	26.20 IN H2O
BED PRESSURE DROP	19.33 IN H2O
BED TUBES FLOW RATE	24402.22 LB/HR
STEAMING RATE	1508.14 LB/HR
RECYCLE SOLIDS	785.04 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	54.00 LB/HR
BED DRAIN SOLIDS	46.00 LB/HR
CYCLONE EFFICIENCY	93.57 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	48.01	973.23	52.47	36.64	15.83
TEST LOOP NO. 2	41.56	953.86	44.91	29.09	15.81
ECONOMIZER	11.69	1244.68	11.89		
SUPERHEATER	21.48	174.55	25.51		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.82	.200	16.60	206.	230.

NOX EMISSIONS (AS FIRED)	.27 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.41 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	215.83 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	240.98 PPM
SULFUR RETENTION	9.70 LB S/HR
SULFUR RETENTION	93.96 PRCT
CALCIUM UTILIZATION	28.06 PRCT
COMBUSTION EFFICIENCY	94.63 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 2 5 79
 DATA RECORDED AT 22 32 C

STEADY STATE RUN K-1
 BASELINE TEST
 FREEMAN COAL
 NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	115.80 LB/HR
TOTAL DRY AIR FLOW	2395.36 LB/HR
PERCENT OF MCR LOAD	97.20 PRCT
THEOR EXCESS AIR	28.73 PRCT
BED TEMPERATURE	1525.40 DEG F
CA/S MOLE RATIO	4.66
SUPERFICIAL VELOCITY	7.58 FT/SEC
FREEBOARD VELOCITY	3.97 FT/SEC
ACTIVE BED HEIGHT	39.86 IN
BED PRESSURE GRADIENT	.76 IN H2O/IN BED
GRID PRESSURE DROP	23.78 IN H2O
BED PRESSURE DROP	30.35 IN H2O
BED TUBES FLOW RATE	26125.99 LB/HR
STEAMING RATE	1384.10 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	60.00 LB/HR
BAGHOUSE SOLIDS	7.00 LB/HR
BED DRAIN SOLIDS	77.00 LB/HR
CYCLONE EFFICIENCY	89.55 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	52.06	843.16	57.97	41.01	16.96
TEST LOOP NO. 2	49.52	895.60	54.58	37.64	16.94
ECONOMIZER	8.30	1078.38	8.42		
SUPERHEATER	17.58	163.71	20.39		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.31	.069	15.07	351.	83.

NOX EMISSIONS (AS FIRED)	.53 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.18 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	402.10 PPM
SO2 EMISSIONS (AT 3PRCT O2)	95.62 PPM
SULFUR RETENTION	7.58 LB S/HR
SULFUR RETENTION	97.17 PRCT
CALCIUM UTILIZATION	20.84 PRCT
COMBUSTION EFFICIENCY	94.76 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-2

DATA RECORDED ON 2 6 79

BASELINE TEST POINT

DATA RECORDED AT 9 30 30

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	116.40 LB/HR
TOTAL DRY AIR FLOW	2376.72 LB/HR
PERCENT OF MCR LOAD	102.77 PRCT
THEOR EXCESS AIR	18.92 PRCT
BED TEMPERATURE	1633.60 DEG F
CA/S MOLE RATIO	4.28
SUPERFICIAL VELOCITY	7.90 FT/SEC
FREEBOARD VELOCITY	3.99 FT/SEC
ACTIVE BED HEIGHT	30.00 IN
BED PRESSURE GRADIENT	1.04 IN H2O/IN BED
GRID PRESSURE DROP	20.09 IN H2O
BED PRESSURE DROP	31.10 IN H2O
BED TUBES FLOW RATE	26245.41 LB/HR
STEAMING RATE	1432.00 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	57.00 LB/HR
BAGHOUSE SOLIDS	8.50 LB/HR
BED DRAIN SOLIDS	55.00 LB/HR
CYCLONE EFFICIENCY	87.22 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	58.38	884.82	65.63	46.16	19.46
TEST LOOP NO. 2	57.40	946.78	64.02	44.58	19.44
ECONOMIZER	8.25	1088.13	8.36		
SUPERHEATER	15.60	169.24	17.69		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	4.31	.034	15.61	272.	275.

NOX EMISSIONS (AS FIRED)	.39 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.54 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	293.13 PPM
SO2 EMISSIONS (AT 3PRCT O2)	296.50 PPM
SULFUR RETENTION	7.81 LB S/HR
SULFUR RETENTION	91.58 PRCT
CALCIUM UTILIZATION	21.39 PRCT
COMBUSTION EFFICIENCY	93.11 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-3

DATA RECORDED ON 2 6 79

BED EQUILIBRIUM CRITERIA

DATA RECORDED AT 13 31 30

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	60.00 LB/HR
TOTAL DRY AIR FLOW	2369.60 LB/HR
PERCENT OF MCR LOAD	108.20 PRCT
THEOR EXCESS AIR	16.46 PRCT
BED TEMPERATURE	1661.77 DEG F
CA/S MOLE RATIO	2.09
SUPERFICIAL VELOCITY	7.92 FT/SEC
FREEBOARD VELOCITY	3.99 FT/SEC
ACTIVE BED HEIGHT	30.13 IN
BED PRESSURE GRADIENT	.79 IN H2O/IN BED
GRID PRESSURE DROP	25.75 IN H2O
BED PRESSURE DROP	23.80 IN H2O
BED TUBES FLOW RATE	26111.51 LB/HR
STEAMING RATE	1452.47 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	46.00 LB/HR
BAGHOUSE SOLIDS	6.00 LB/HR
BED DRAIN SOLIDS	29.00 LB/HR
CYCLONE EFFICIENCY	88.68 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	59.25	881.44	66.75	46.62	20.12
TEST LOOP NO. 2	58.42	944.82	65.32	45.21	20.10
ECONOMIZER	8.18	1096.08	8.30		
SUPERHEATER	15.63	170.96	17.70		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	4.39	.062	15.05	237.	1250.

NOX EMISSIONS (AS FIRED)	.32 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.33 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	257.20 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1354.81 PPM
SULFUR RETENTION	5.77 LB S/HR
SULFUR RETENTION	64.05 PRCT
CALCIUM UTILIZATION	30.63 PRCT
COMBUSTION EFFICIENCY	95.73 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

DATA RECORDED ON 2 8 79

DATA RECORDED AT 10 31 30

STEADY STATE RUN K-5
MATRIX TEST POINT NO. 20
FREEMAN COAL
NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	195.78 LB/HR
LIME FEED RATE (AS FIRED)	48.00 LB/HR
TOTAL DRY AIR FLOW	1748.40 LB/HR
PERCENT OF MCR LOAD	83.52 PRCT
THEOR EXCESS AIR	8.66 PRCT
BED TEMPERATURE	1469.98 DEG F
CA/S MOLE RATIO	2.03
SUPERFICIAL VELOCITY	5.40 FT/SEC
FREEBOARD VELOCITY	2.78 FT/SEC
ACTIVE BED HEIGHT	43.55 IN
BED PRESSURE GRADIENT	.74 IN H2O/IN BED
GRID PRESSURE DROP	16.16 IN H2O
BED PRESSURE DROP	32.42 IN H2O
BED TUBES FLOW RATE	26231.19 LB/HR
STEAMING RATE	1061.64 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	33.00 LB/HR
BAGHOUSE SOLIDS	7.50 LB/HR
BED DRAIN SOLIDS	41.00 LB/HR
CYCLONE EFFICIENCY	81.93 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.84	916.53	56.11	40.30	15.81
TEST LOOP NO. 2	41.07	918.39	44.43	28.65	15.78
ECONOMIZER	6.41	845.27	6.49		
SUPERHEATER	13.07	133.78	14.92		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.60	.254	16.51	123.	320.

NOX EMISSIONS (AS FIRED)	.16 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.58 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	127.02 PPM
SO2 EMISSIONS (AT 3PRCT O2)	330.99 PPM
SULFUR RETENTION	6.82 LB S/HR
SULFUR RETENTION	91.69 PRCT
CALCIUM UTILIZATION	45.22 PRCT
COMBUSTION EFFICIENCY	90.58 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-6

DATA RECORDED ON 2 8 79

MATRIX TEST POINT NO. 21

DATA RECORDED AT 13 21 30

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	195.78 LB/HR
LIME FEED RATE (AS FIRED)	47.40 LB/HR
TOTAL DRY AIR FLOW	1933.22 LB/HR
PERCENT OF MCR LOAD	83.52 PRCT
THEOR EXCESS AIR	20.18 PRCT
BED TEMPERATURE	1482.03 DEG F
CA/S MOLE RATIO	2.11
SUPERFICIAL VELOCITY	5.95 FT/SEC
FREEBOARD VELOCITY	3.04 FT/SEC
ACTIVE BED HEIGHT	35.72 IN
BED PRESSURE GRADIENT	1.01 IN H2O/IN BED
GRID PRESSURE DROP	15.07 IN H2O
BED PRESSURE DROP	35.91 IN H2O
BED TUBES FLOW RATE	26433.02 LB/HR
STEAMING RATE	1104.45 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	22.00 LB/HR
BAGHOUSE SOLIDS	5.00 LB/HR
BED DRAIN SOLIDS	27.00 LB/HR
CYCLONE EFFICIENCY	82.14 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	31.50	928.03	56.86	40.80	16.06
TEST LOOP NO. 2	42.93	925.98	46.59	30.55	16.04
ECONOMIZER	6.84	872.54	6.93		
SUPERHEATER	13.54	138.00	15.47		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	4.98	.135	14.97	169.	290.

NOX EMISSIONS (AS FIRED)	.24 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.58 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	189.47 PPM
SO2 EMISSIONS (AT 3PRCT O2)	325.89 PPM
SULFUR RETENTION	6.43 LB S/HR
SULFUR RETENTION	91.24 PRCT
CALCIUM UTILIZATION	43.17 PRCT
COMBUSTION EFFICIENCY	95.35 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-7

DATA RECORDED ON 2 8 79

MATRIX TEST POINT NO. 22

DATA RECORDED AT 23 33 0

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	195.78 LB/HR
LIME FEED RATE (AS FIRED)	47.40 LB/HR
TOTAL DRY AIR FLOW	2058.59 LB/HR
PERCENT OF MCR LOAD	82.03 PRCT
THEOR EXCESS AIR	29.96 PRCT
BED TEMPERATURE	1468.70 DEG F
CA/S MOLE RATIO	2.05
SUPERFICIAL VELOCITY	6.02 FT/SEC
FREEBOARD VELOCITY	3.27 FT/SEC
ACTIVE BED HEIGHT	29.86 IN
BED PRESSURE GRADIENT	1.36 IN H2O/IN BED
GRID PRESSURE DROP	13.30 IN H2O
BED PRESSURE DROP	40.57 IN H2O
BED TUBES FLOW RATE	26385.78 LB/HR
STEAMING RATE	1116.69 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	30.00 LB/HR
BAGHOUSE SOLIDS	4.50 LB/HR
BED DRAIN SOLIDS	32.00 LB/HR
CYCLONE EFFICIENCY	87.32 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UD	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.23	970.06	55.14	39.36	15.78
TEST LOOP NO. 2	41.71	980.23	45.02	29.26	15.76
ECONOMIZER	6.89	893.92	6.98		
SUPERHEATER	13.82	139.11	15.82		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	6.26	.107	14.26	234.	600.

NOX EMISSIONS (AS FIRED)	.36 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	1.30 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	285.29 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	732.45 PPM
SULFUR RETENTION	5.87 LB S/HR
SULFUR RETENTION	81.09 PRCT
CALCIUM UTILIZATION	39.47 PRCT
COMBUSTION EFFICIENCY	92.99 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-8
MATRIX TEST POINT NO. 23
FREEMAN COAL
NO RECYCLE

DATA RECORDED ON 2 9 79
DATA RECORDED AT 5 33 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	195.78 LB/HR
LIME FEED RATE (AS FIRED)	46.20 LB/HR
TOTAL DRY AIR FLOW	2237.42 LB/HR
PERCENT OF MCR LOAD	82.25 PRCT
THEOR EXCESS AIR	40.90 PRCT
BED TEMPERATURE	1419.77 DEG F
CA/S MOLE RATIO	2.00
SUPERFICIAL VELOCITY	6.64 FT/SEC
FREEBOARD VELOCITY	3.50 FT/SEC
ACTIVE BED HEIGHT	35.23 IN
BED PRESSURE GRADIENT	1.02 IN H2O/IN BED
GRID PRESSURE DROP	22.50 IN H2O
BED PRESSURE DROP	36.09 IN H2O
BED TUBES FLOW RATE	26062.25 LB/HR
STEAMING RATE	1089.98 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	28.00 LB/HR
BAGHOUSE SOLIDS	4.50 LB/HR
BED DRAIN SOLIDS	33.00 LB/HR
CYCLONE EFFICIENCY	86.57 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	47.89	978.82	52.30	37.53	14.78
TEST LOOP NO. 2	39.54	982.83	42.49	27.73	14.76
ECONOMIZER	6.93	869.93	7.03		
SUPERHEATER	13.99	136.20	16.09		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	8.18	.099	12.05	832.	1350.

NOX EMISSIONS (AS FIRED)	1.40 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	3.16 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	1167.81 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1895.11 PPM
SULFUR RETENTION	3.90 LB S/HR
SULFUR RETENTION	53.86 PRCT
CALCIUM UTILIZATION	26.87 PRCT
COMBUSTION EFFICIENCY	91.18 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

DATA RECORDED ON 2 9 79

DATA RECORDED AT 10 32 30

STEADY STATE RUN K-9

MATRIX TEST POINT NO. 24

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	58.20 LB/HR
TOTAL DRY AIR FLOW	2192.28 LB/HR
PERCENT OF MCR LOAD	96.80 PRCT
THEOR EXCESS AIR	15.14 PRCT
BED TEMPERATURE	1560.85 DEG F
CA/S MOLE RATIO	2.14
SUPERFICIAL VELOCITY	7.02 FT/SEC
FREEBOARD VELOCITY	3.64 FT/SEC
ACTIVE BED HEIGHT	39.18 IN
BED PRESSURE GRADIENT	.98 IN H2O/IN BED
GRID PRESSURE DROP	19.03 IN H2O
BED PRESSURE DROP	38.47 IN H2O
BED TUBES FLOW RATE	26488.32 LB/HR
STEAMING RATE	1317.41 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	28.00 LB/HR
BAGHOUSE SOLIDS	8.00 LB/HR
BED DRAIN SOLIDS	17.00 LB/HR
CYCLONE EFFICIENCY	78.38 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.78	978.67	55.78	38.01	17.76
TEST LOOP NO. 2	43.58	982.28	47.20	29.46	17.74
ECONOMIZER	7.76	1033.51	7.87		
SUPERHEATER	15.88	157.58	18.23		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	4.30	.149	15.23	787.	550.

NOX EMISSIONS (AS FIRED)	1.09 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.06 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	847.83 PPM
SO2 EMISSIONS (AT 3PRCT O2)	592.81 PPM
SULFUR RETENTION	7.21 LB S/HR
SULFUR RETENTION	84.50 PRCT
CALCIUM UTILIZATION	39.40 PRCT
COMBUSTION EFFICIENCY	94.66 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-10
MATRIX TEST POINT NO. 25
FREEMAN COAL
NO RECYCLE

DATA RECORDED ON 2 13 79
DATA RECORDED AT 3 28 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	58.20 LB/HR
TOTAL DRY AIR FLOW	2434.06 LB/HR
PERCENT OF MCR LOAD	101.57 PRCT
THEOR EXCESS AIR	26.65 PRCT
BED TEMPERATURE	1467.53 DEG F
CA/S MOLE RATIO	2.01
SUPERFICIAL VELOCITY	7.51 FT/SEC
FREEBOARD VELOCITY	4.03 FT/SEC
ACTIVE BED HEIGHT	37.38 IN
BED PRESSURE GRADIENT	.95 IN H2O/IN BED
GRID PRESSURE DROP	28.38 IN H2O
BED PRESSURE DROP	35.52 IN H2O
BED TUBES FLOW RATE	28178.84 LB/HR
STEAMING RATE	1322.73 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	44.00 LB/HR
BAGHOUSE SOLIDS	3.00 LB/HR
BED DRAIN SOLIDS	38.00 LB/HR
CYCLONE EFFICIENCY	93.75 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT²/DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	48.75	873.72	53.76	37.94	15.82
TEST LOOP NO. 2	41.54	855.92	45.17	29.37	15.80
ECONOMIZER	8.07	1085.17	8.18		
SUPERHEATER	16.88	157.89	19.55		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	6.82	.100	13.98	190.	700.

NOX EMISSIONS (AS FIRED)	.28 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.45 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	241.23 PPM
SO2 EMISSIONS (AT 3PRCT O2)	888.73 PPM
SULFUR RETENTION	7.12 LB S/HR
SULFUR RETENTION	78.97 PRCT
CALCIUM UTILIZATION	39.32 PRCT
COMBUSTION EFFICIENCY	92.96 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

DATA RECORDED ON 2 13 79

DATA RECORDED AT 5 30 0

STEADY STATE POINT K-11
MATRIX TEST POINT NO. 26
FREEMAN COAL
NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	58.20 LB/HR
TOTAL DRY AIR FLOW	2625.82 LB/HR
PERCENT OF MCR LOAD	104.62 PRCT
THEOR EXCESS AIR	28.37 PRCT
BED TEMPERATURE	1456.93 DEG F
CA/S MOLE RATIO	1.87
SUPERFICIAL VELOCITY	8.05 FT/SEC
FREEBOARD VELOCITY	4.35 FT/SEC
ACTIVE BED HEIGHT	37.18 IN
BED PRESSURE GRADIENT	.96 IN H2O/IN BED
GRID PRESSURE DROP	30.99 IN H2O
BED PRESSURE DROP	35.52 IN H2O
BED TUBES FLOW RATE	28259.81 LB/HR
STEAMING RATE	1344.05 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	43.00 LB/HR
BAGHOUSE SOLIDS	8.00 LB/HR
BED DRAIN SOLIDS	35.00 LB/HR
CYCLONE EFFICIENCY	84.62 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	47.75	886.34	52.48	36.88	15.60
TEST LOOP NO. 2	40.63	869.55	44.06	28.48	15.58
ECONOMIZER	8.33	1088.07	8.44		
SUPERHEATER	17.45	159.72	20.28		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	8.02	.090	13.02	215.	700.

NOX EMISSIONS (AS FIRED)	.34 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.53 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	298.15 PPM
SO2 EMISSIONS (AT 3PRCT O2)	970.72 PPM
SULFUR RETENTION	7.70 LB S/HR
SULFUR RETENTION	78.95 PRCT
CALCIUM UTILIZATION	42.24 PRCT
COMBUSTION EFFICIENCY	92.99 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-12

DATA RECORDED ON 2 13 79

MATRIX TEST POINT NO. 27

DATA RECORDED AT 9 36 30

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	59.42 LB/HR
TOTAL DRY AIR FLOW	2830.56 LB/HR
PERCENT OF MCR LOAD	106.74 PRCT
THEOR EXCESS AIR	37.05 PRCT
BED TEMPERATURE	1476.85 DEG F
CA/S MOLE RATIO	1.90
SUPERFICIAL VELOCITY	8.65 FT/SEC
FREEBOARD VELOCITY	4.65 FT/SEC
ACTIVE BED HEIGHT	37.30 IN
BED PRESSURE GRADIENT	.99 IN H2O/IN BED
GRID PRESSURE DROP	33.04 IN H2O
BED PRESSURE DROP	37.06 IN H2O
BED TUBES FLOW RATE	28273.99 LB/HR
STEAMING RATE	1364.69 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	40.00 LB/HR
BAGHOUSE SOLIDS	5.00 LB/HR
BED DRAIN SOLIDS	36.00 LB/HR
CYCLONE EFFICIENCY	89.13 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	46.99	896.79	51.53	35.52	16.01
TEST LOOP NO. 2	39.76	871.25	43.03	27.04	15.99
ECONOMIZER	8.94	1113.66	9.07		
SUPERHEATER	17.89	161.41	20.85		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	8.56	.040	12.11	230.	650.

NOX EMISSIONS (AS FIRED)	.38 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	1.49 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	333.09 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	940.51 PPM
SULFUR RETENTION	7.70 LB S/HR
SULFUR RETENTION	79.04 PRCT
CALCIUM UTILIZATION	41.51 PRCT
COMBUSTION EFFICIENCY	94.69 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-13

DATA RECORDED ON 2 13 79

MATRIX TEST POINT NO. 28

DATA RECORDED AT 12 15 59

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	291.58 LB/HR
LIME FEED RATE (AS FIRED)	69.00 LB/HR
TOTAL DRY AIR FLOW	2626.71 LB/HR
PERCENT OF MCR LOAD	126.62 PRCT
THEOR EXCESS AIR	5.46 PRCT
BED TEMPERATURE	1662.53 DEG F
CA/S MOLE RATIO	1.91
SUPERFICIAL VELOCITY	8.83 FT/SEC
FREEBOARD VELOCITY	4.62 FT/SEC
ACTIVE BED HEIGHT	37.42 IN
BED PRESSURE GRADIENT	.91 IN H2O/IN BED
GRID PRESSURE DROP	30.84 IN H2O
BED PRESSURE DROP	34.20 IN H2O
BED TUBES FLOW RATE	28254.43 LB/HR
STEAMING RATE	1623.60 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	57.00 LB/HR
BAGHOUSE SOLIDS	6.50 LB/HR
BED DRAIN SOLIDS	27.00 LB/HR
CYCLONE EFFICIENCY	89.92 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	51.00	889.60	56.43	36.20	20.22
TEST LOOP NO. 2	44.26	872.86	48.35	28.15	20.20
ECONOMIZER	9.56	1271.17	9.70		
SUPERHEATER	18.26	185.14	20.91		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	4.28	.107	14.89	216.	1400.

NOX EMISSIONS (AS FIRED)	.27 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.47 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	232.86 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1507.18 PPM
SULFUR RETENTION	7.36 LB S/HR
SULFUR RETENTION	64.70 PRCT
CALCIUM UTILIZATION	33.93 PRCT

COMBUSTION EFFICIENCY	95.32 PRCT
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PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 2 13 79
 DATA RECORDED AT 15 13 0

STEADY STATE RUN K-14
 MATRIX TEST POINT NO. 29
 FREEMAN COAL
 NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	291.58 LB/HR
LIME FEED RATE (AS FIRED)	70.20 LB/HR
TOTAL DRY AIR FLOW	2882.65 LB/HR
PERCENT OF MCR LOAD	124.55 PRCT
THEOR EXCESS AIR	18.24 PRCT
BED TEMPERATURE	1606.75 DEG F
CA/S MOLE RATIO	1.89
SUPERFICIAL VELOCITY	9.20 FT/SEC
FREEBOARD VELOCITY	4.87 FT/SEC
ACTIVE BED HEIGHT	37.10 IN
BED PRESSURE GRADIENT	.94 IN H2O/IN BED
GRID PRESSURE DROP	37.19 IN H2O
BED PRESSURE DROP	35.02 IN H2O
BED TUBES FLOW RATE	28442.65 LB/HR
STEAMING RATE	1624.77 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	53.50 LB/HR
BAGHOUSE SOLIDS	5.00 LB/HR
BED DRAIN SOLIDS	29.00 LB/HR
CYCLONE EFFICIENCY	91.60 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	51.81	900.53	57.37	38.48	18.88
TEST LOOP NO. 2	45.54	877.05	49.86	30.99	18.86
ECONOMIZER	9.99	1277.57	10.14		
SUPERHEATER	19.16	185.12	22.12		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	5.90	.053	11.79	283.	600.

NOX EMISSIONS (AS FIRED)	.39 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	1.16 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	337.11 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	715.23 PPM
SULFUR RETENTION	9.81 LB S/HR
SULFUR RETENTION	84.13 PRCT
CALCIUM UTILIZATION	44.48 PRCT

COMBUSTION EFFICIENCY	92.46 PRCT
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PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-15
MATRIX TEST POINT NO. 30
FREEMAN COAL
NO RECYCLE

DATA RECORDED ON 2 13 79
DATA RECORDED AT 18 48 30

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	339.48 LB/HR
LIME FEED RATE (AS FIRED)	79.80 LB/HR
TOTAL DRY AIR FLOW	2924.79 LB/HR
PERCENT OF MCR LOAD	147.97 PRCT
THEOR EXCESS AIR	1.38 PRCT
BED TEMPERATURE	1690.93 DEG F
CA/S MOLE RATIO	1.85
SUPERFICIAL VELOCITY	9.97 FT/SEC
FREEBOARD VELOCITY	5.33 FT/SEC
ACTIVE BED HEIGHT	35.06 IN
BED PRESSURE GRADIENT	1.02 IN H2O/IN BED
GRID PRESSURE DROP	37.08 IN H2O
BED PRESSURE DROP	35.90 IN H2O
BED TUBES FLOW RATE	28445.40 LB/HR
STEAMING RATE	1908.53 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	75.00 LB/HR
BAGHOUSE SOLIDS	5.00 LB/HR
BED DRAIN SOLIDS	24.00 LB/HR
CYCLONE EFFICIENCY	93.83 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	53.68	907.01	59.63	38.73	20.91
TEST LOOP NO. 2	47.27	880.97	51.92	31.04	20.89
ECONOMIZER	10.74	1449.87	10.90		
SUPERHEATER	22.43	209.29	26.05		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	3.37	.187	13.27	209.	1800.

NOX EMISSIONS (AS FIRED)	.25 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	3.01 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	213.73 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1837.26 PPM
SULFUR RETENTION	7.86 LB S/HR
SULFUR RETENTION	57.90 PRCT
CALCIUM UTILIZATION	31.35 PRCT
COMBUSTION EFFICIENCY	89.26 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-16

DATA RECORDED ON 2 13 79

MATRIX TEST POINT NO. 45

DATA RECORDED AT 23 13 58

FREEMAN COAL

WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	339.48 LB/HR
LIME FEED RATE (AS FIRED)	120.00 LB/HR
TOTAL DRY AIR FLOW	2902.40 LB/HR
PERCENT OF MCR LOAD	148.16 PRCT
THEOR EXCESS AIR	2.77 PRCT
BED TEMPERATURE	1499.94 DEG F
CA/S MOLE RATIO	5.05
SUPERFICIAL VELOCITY	9.13 FT/SEC
FREEBOARD VELOCITY	5.05 FT/SEC
ACTIVE BED HEIGHT	45.05 IN
BED PRESSURE GRADIENT	.87 IN H2O/IN BED
GRID PRESSURE DROP	36.57 IN H2O
BED PRESSURE DROP	39.01 IN H2O
BED TUBES FLOW RATE	28170.06 LB/HR
STEAMING RATE	1944.28 LB/HR
RECYCLE SOLIDS	619.09 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	54.50 LB/HR
BED DRAIN SOLIDS	32.00 LB/HR
CYCLONE EFFICIENCY	91.92 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	51.89	902.51	57.44	41.00	16.44
TEST LOOP NO. 2	46.53	879.55	51.04	34.60	16.43
ECONOMIZER	12.28	1485.43	12.49		
SUPERHEATER	27.17	213.50	32.55		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	3.22	.344	16.61	250.	300.

NOX EMISSIONS (AS FIRED)	.30 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.50 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	253.06 PPM
SO2 EMISSIONS (AT 3PRCT O2)	303.67 PPM
SULFUR RETENTION	6.51 LB S/HR
SULFUR RETENTION	87.15 PRCT
CALCIUM UTILIZATION	17.26 PRCT
COMBUSTION EFFICIENCY	95.81 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-17

DATA RECORDED ON 2 14 79

MATRIX TEST POINT NO. 35

DATA RECORDED AT 11 4 20

FREEMAN COAL

WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	195.78 LB/HR
LIME FEED RATE (AS FIRED)	70.20 LB/HR
TOTAL DRY AIR FLOW	1769.64 LB/HR
PERCENT OF MCR LOAD	83.74 PRCT
THEOR EXCESS AIR	10.12 PRCT
BED TEMPERATURE	1544.50 DEG F
CA/S MOLE RATIO	2.89
SUPERFICIAL VELOCITY	5.70 FT/SEC
FREEBOARD VELOCITY	3.00 FT/SEC
ACTIVE BED HEIGHT	31.06 IN
BED PRESSURE GRADIENT	.66 IN H2O/IN BED
GRID PRESSURE DROP	14.04 IN H2O
BED PRESSURE DROP	20.52 IN H2O
BED TUBES FLOW RATE	28182.89 LB/HR
STEAMING RATE	1100.54 LB/HR
RECYCLE SOLIDS	314.42 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	22.00 LB/HR
BED DRAIN SOLIDS	.19 LB/HR
CYCLONE EFFICIENCY	93.43 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	49.89	942.88	54.84	37.33	17.51
TEST LOOP NO. 2	43.03	921.32	46.72	29.23	17.49
ECONOMIZER	9.09	951.71	9.24		
SUPERHEATER	14.62	135.36	16.95		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	2.30	.498	17.70	150.	375.

NOX EMISSIONS (AS FIRED)	.20 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.63 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	144.39 PPM
SO2 EMISSIONS (AT 3PRCT O2)	360.96 PPM
SULFUR RETENTION	6.90 LB S/HR
SULFUR RETENTION	90.38 PRCT
CALCIUM UTILIZATION	31.28 PRCT
COMBUSTION EFFICIENCY	94.66 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 2 14 79
 DATA RECORDED AT 13 10 20

STEADY STATE RUN K-18
 MATRIX TEST POINT NO. 36
 FREEMAN COAL
 WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	195.78 LB/HR
LIME FEED RATE (AS FIRED)	70.20 LB/HR
TOTAL DRY AIR FLOW	1932.49 LB/HR
PERCENT OF MCR LOAD	80.97 PRCT
THEOR EXCESS AIR	21.74 PRCT
BED TEMPERATURE	1478.00 DEG F
CA/S MOLE RATIO	2.97
SUPERFICIAL VELOCITY	5.98 FT/SEC
FREEBOARD VELOCITY	3.23 FT/SEC
ACTIVE BED HEIGHT	28.41 IN
BED PRESSURE GRADIENT	.73 IN H2O/IN BED
GRID PRESSURE DROP	16.98 IN H2O
BED PRESSURE DROP	20.84 IN H2O
BED TUBES FLOW RATE	28079.63 LB/HR
STEAMING RATE	1184.74 LB/HR
RECYCLE SOLIDS	397.27 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	37.00 LB/HR
BED DRAIN SOLIDS	46.00 LB/HR
CYCLONE EFFICIENCY	91.50 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.40	939.85	55.46	39.40	16.06
TEST LOOP NO. 2	43.24	921.50	46.98	30.93	16.05
ECONOMIZER	9.48	1012.93	9.64		
SUPERHEATER	16.62	143.62	19.50		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.24	.302	16.70	136.	175.

NOX EMISSIONS (AS FIRED)	.20 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.36 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	138.06 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	177.39 PPM
SULFUR RETENTION	7.07 LB S/HR
SULFUR RETENTION	94.99 PRCT
CALCIUM UTILIZATION	32.03 PRCT
COMBUSTION EFFICIENCY	93.09 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-19

DATA RECORDED ON 2 14 79

MATRIX TEST POINT NO. 39

DATA RECORDED AT 22 43 0

FREEMAN COAL

WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	87.00 LB/HR
TOTAL DRY AIR FLOW	2170.90 LB/HR
PERCENT OF MCR LOAD	109.00 PRCT
THEOR EXCESS AIR	3.96 PRCT
BED TEMPERATURE	1483.30 DEG F
CA/S MOLE RATIO	3.03
SUPERFICIAL VELOCITY	6.77 FT/SEC
FREEBOARD VELOCITY	3.69 FT/SEC
ACTIVE BED HEIGHT	28.49 IN
BED PRESSURE GRADIENT	.88 IN H2O/IN BED
GRID PRESSURE DROP	17.75 IN H2O
BED PRESSURE DROP	25.10 IN H2O
BED TUBES FLOW RATE	28124.86 LB/HR
STEAMING RATE	1378.64 LB/HR
RECYCLE SOLIDS	458.82 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	40.00 LB/HR
BED DRAIN SOLIDS	40.00 LB/HR
CYCLONE EFFICIENCY	92.00 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	49.58	957.54	54.40	38.24	16.16
TEST LOOP NO. 2	42.13	935.81	45.62	29.48	16.15
ECONOMIZER	10.50	1142.50	10.68		
SUPERHEATER	18.93	162.18	22.26		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	2.92	.450	17.30	153.	175.

NOX EMISSIONS (AS FIRED)	.19 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.30 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	151.83 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	174.23 PPM
SULFUR RETENTION	8.59 LB S/HR
SULFUR RETENTION	95.33 PRCT
CALCIUM UTILIZATION	31.44 PRCT

COMBUSTION EFFICIENCY	93.96 PRCT
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PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-20

DATA RECORDED ON 2 15 79

MATRIX TEST POINT NO. 40

DATA RECORDED AT 4 0 0

FREEMAN COAL

WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.30 LB/HR
LIME FEED RATE (AS FIRED)	87.00 LB/HR
TOTAL DRY AIR FLOW	2341.14 LB/HR
PERCENT OF MCR LOAD	104.99 PRCT
THEOR EXCESS AIR	15.00 PRCT
BED TEMPERATURE	1497.53 DEG F
CA/S MOLE RATIO	3.04
SUPERFICIAL VELOCITY	7.31 FT/SEC
FREEBOARD VELOCITY	3.94 FT/SEC
ACTIVE BED HEIGHT	25.62 IN
BED PRESSURE GRADIENT	.83 IN H2O/IN BED
GRID PRESSURE DROP	22.94 IN H2O
BED PRESSURE DROP	21.17 IN H2O
BED TUBES FLOW RATE	28294.89 LB/HR
STEAMING RATE	1408.69 LB/HR
RECYCLE SOLIDS	716.97 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	36.00 LB/HR
BED DRAIN SOLIDS	32.00 LB/HR
CYCLONE EFFICIENCY	95.23 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	49.11	967.37	53.80	37.34	16.46
TEST LOOP NO. 2	42.83	950.00	46.41	29.96	16.45
ECONOMIZER	11.05	1180.56	11.24		
SUPERHEATER	20.03	165.13	23.71		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	4.48	.250	15.90	185.	225.

NOX EMISSIONS (AS FIRED)	.25 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.43 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	201.57 PPM
SO2 EMISSIONS (AT 3PRCT O2)	245.16 PPM
SULFUR RETENTION	8.42 LB S/HR
SULFUR RETENTION	93.51 PRCT
CALCIUM UTILIZATION	30.79 PRCT
COMBUSTION EFFICIENCY	95.29 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 2 15 79
 DATA RECORDED AT 12 42 30

STEADY STATE RUN K-21
 MATRIX TEST POINT NO. 41
 FREEMAN COAL
 WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	87.00 LB/HR
TOTAL DRY AIR FLOW	2543.06 LB/HR
PERCENT OF MCR LOAD	104.22 PRCT
THEOR EXCESS AIR	22.67 PRCT
BED TEMPERATURE	1486.90 DEG F
CA/S MOLE RATIO	3.12
SUPERFICIAL VELOCITY	7.87 FT/SEC
FREEBOARD VELOCITY	4.20 FT/SEC
ACTIVE BED HEIGHT	21.72 IN
BED PRESSURE GRADIENT	.56 IN H2O/IN BED
GRID PRESSURE DROP	31.73 IN H2O
BED PRESSURE DROP	12.16 IN H2O
BED TUBES FLOW RATE	27809.71 LB/HR
STEAMING RATE	1409.73 LB/HR
RECYCLE SOLIDS	1909.63 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	36.00 LB/HR
BED DRAIN SOLIDS	51.00 LB/HR
CYCLONE EFFICIENCY	98.15 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	46.95	991.82	51.14	34.92	16.22
TEST LOOP NO. 2	42.07	960.78	45.49	29.27	16.22
ECONOMIZER	11.60	1205.89	11.81		
SUPERHEATER	22.51	167.34	27.21		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.65	.200	14.94	201.	190.

NOX EMISSIONS (AS FIRED)	.30 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.40 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	235.74 PPM
SO2 EMISSIONS (AT 3PRCT O2)	222.73 PPM
SULFUR RETENTION	8.24 LB S/HR
SULFUR RETENTION	93.88 PRCT
CALCIUM UTILIZATION	30.12 PRCT

COMBUSTION EFFICIENCY	95.55 PRCT
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PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-22

DATA RECORDED ON 2 15 79

MATRIX TEST POINT NO. 43

DATA RECORDED AT 17 45 0

FREEMAN COAL

WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	291.58 LB/HR
LIME FEED RATE (AS FIRED)	103.20 LB/HR
TOTAL DRY AIR FLOW	2621.48 LB/HR
PERCENT OF MCR LOAD	131.50 PRCT
THEOR EXCESS AIR	5.72 PRCT
BED TEMPERATURE	1469.63 DEG F
CA/S MOLE RATIO	2.85
SUPERFICIAL VELOCITY	8.12 FT/SEC
FREEBOARD VELOCITY	4.46 FT/SEC
ACTIVE BED HEIGHT	29.97 IN
BED PRESSURE GRADIENT	.71 IN H2O/IN BED
GRID PRESSURE DROP	28.93 IN H2O
BED PRESSURE DROP	21.41 IN H2O
BED TUBES FLOW RATE	28216.87 LB/HR
STEAMING RATE	1593.69 LB/HR
RECYCLE SOLIDS	623.24 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	40.50 LB/HR
BED DRAIN SOLIDS	45.00 LB/HR
CYCLONE EFFICIENCY	93.91 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.76	997.84	55.68	39.83	15.85
TEST LOOP NO. 2	44.03	964.88	47.78	31.94	15.84
ECONOMIZER	12.84	1343.22	13.07		
SUPERHEATER	23.27	183.16	27.83		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂ PRCT	CO PRCT	CO ₂ PRCT	NOX PPM	SO ₂ PPM
FURNACE OUTLET	4.07	.300	16.13	160.	280.

NOX EMISSIONS (AS FIRED)	.20 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.48 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	170.11 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	297.70 PPM
SULFUR RETENTION	10.56 LB S/HR
SULFUR RETENTION	92.86 PRCT
CALCIUM UTILIZATION	32.56 PRCT

COMBUSTION EFFICIENCY	95.05 PRCT
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PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

DATA RECORDED ON 2 15 79

DATA RECORDED AT 22 3 30

STEADY STATE RUN K-23

MATRIX TEST POINT NO. 43-A

FREEMAN COAL

WITH RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	291.58 LB/HR
LIME FEED RATE (AS FIRED)	103.20 LB/HR
TOTAL DRY AIR FLOW	2613.36 LB/HR
PERCENT OF MCR LOAD	127.41 PRCT
THEOR EXCESS AIR	3.78 PRCT
BED TEMPERATURE	1469.63 DEG F
CA/S MOLE RATIO	2.93
SUPERFICIAL VELOCITY	8.10 FT/SEC
FREEBOARD VELOCITY	4.47 FT/SEC
ACTIVE BED HEIGHT	31.38 IN
BED PRESSURE GRADIENT	.69 IN H2O/IN BED
GRID PRESSURE DROP	29.79 IN H2O
BED PRESSURE DROP	21.51 IN H2O
BED TUBES FLOW RATE	28241.69 LB/HR
STEAMING RATE	1610.64 LB/HR
RECYCLE SOLIDS	611.07 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	59.00 LB/HR
BED DRAIN SOLIDS	55.00 LB/HR
CYCLONE EFFICIENCY	91.21 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	52.76	1014.57	58.02	42.16	15.86
TEST LOOP NO. 2	45.36	979.17	49.30	33.45	15.85
ECONOMIZER	12.39	1305.59	12.61		
SUPERHEATER	22.90	184.20	27.27		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.96	.250	15.93	640.	210.

NOX EMISSIONS (AS FIRED)	.81 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.37 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	676.38 PPM
SO2 EMISSIONS (AT 3PRCT O2)	221.80 PPM
SULFUR RETENTION	10.48 LB S/HR
SULFUR RETENTION	94.54 PRCT
CALCIUM UTILIZATION	32.30 PRCT
COMBUSTION EFFICIENCY	93.36 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN K-24

DATA RECORDED ON 2 16 79

BASELINE TEST POINT

DATA RECORDED AT 10 17 45

FREEMAN COAL

NO RECYCLE

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	243.68 LB/HR
LIME FEED RATE (AS FIRED)	115.80 LB/HR
TOTAL DRY AIR FLOW	2323.51 LB/HR
PERCENT OF MCR LOAD	105.68 PRCT
THEOR EXCESS AIR	18.80 PRCT
BED TEMPERATURE	1510.90 DEG F
CA/S MOLE RATIO	4.15
SUPERFICIAL VELOCITY	7.33 FT/SEC
FREEBOARD VELOCITY	3.82 FT/SEC
ACTIVE BED HEIGHT	33.52 IN
BED PRESSURE GRADIENT	1.07 IN H2O/IN BED
GRID PRESSURE DROP	19.00 IN H2O
BED PRESSURE DROP	35.85 IN H2O
BED TUBES FLOW RATE	28218.92 LB/HR
STEAMING RATE	1258.20 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	58.00 LB/HR
BAGHOUSE SOLIDS	7.00 LB/HR
BED DRAIN SOLIDS	30.00 LB/HR
CYCLONE EFFICIENCY	89.39 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	52.49	917.51	58.11	41.35	16.76
TEST LOOP NO. 2	48.49	936.42	53.18	36.43	16.75
ECONOMIZER	8.20	1066.19	8.31		
SUPERHEATER	15.77	132.34	18.17		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	6.30	.152	14.74	279.	175.

NOX EMISSIONS (AS FIRED)	.38 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.33 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	342.01 PPM
SO2 EMISSIONS (AT 3PRCT O2)	214.21 PPM
SULFUR RETENTION	8.32 LB S/HR
SULFUR RETENTION	94.83 PRCT
CALCIUM UTILIZATION	22.86 PRCT
COMBUSTION EFFICIENCY	95.27 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-1

DATA RECORDED ON 3 12 79

BASELINE TEST POINT

DATA RECORDED AT 14 59 0

NO RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	248.60 LB/HR
LIME FEED RATE (AS FIRED)	116.00 LB/HR
TOTAL DRY AIR FLOW	2417.03 LB/HR
PERCENT OF MCR LOAD	105.92 PRCT
THEOR EXCESS AIR	19.77 PRCT
BED TEMPERATURE	1521.40 DEG F
CA/S MOLE RATIO	3.63
SUPERFICIAL VELOCITY	7.63 FT/SEC
FREEBOARD VELOCITY	4.02 FT/SEC
ACTIVE BED HEIGHT	41.02 IN
BED PRESSURE GRADIENT	.91 IN H2O/IN BED
GRID PRESSURE DROP	23.56 IN H2O
BED PRESSURE DROP	37.26 IN H2O
BED TUBES FLOW RATE	32104.36 LB/HR
STEAMING RATE	1549.79 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	70.50 LB/HR
BAGHOUSE SOLIDS	5.50 LB/HR
BED DRAIN SOLIDS	28.00 LB/HR
CYCLONE EFFICIENCY	92.76 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	53.59	1012.60	59.04	41.89	17.15
TEST LOOP NO. 2	45.34	951.29	49.37	32.23	17.14
ECONOMIZER	8.79	1234.91	8.91		
SUPERHEATER	19.52	179.40	22.70		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	4.98	.078	15.50	305.	32.

NOX EMISSIONS (AS FIRED)	.43 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.06 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	342.70 PPM
SO2 EMISSIONS (AT 3PRCT O2)	35.96 PPM
SULFUR RETENTION	9.86 LB S/HR
SULFUR RETENTION	99.14 PRCT
CALCIUM UTILIZATION	27.29 PRCT
COMBUSTION EFFICIENCY	93.07 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-2

DATA RECORDED ON 3 12 79

MATRIX TEST POINT NO. 28

DATA RECORDED AT 18 31 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	229.40 LB/HR
LIME FEED RATE (AS FIRED)	107.00 LB/HR
TOTAL DRY AIR FLOW	2368.14 LB/HR
PERCENT OF MCR LOAD	99.49 PRCT
THEOR EXCESS AIR	24.59 PRCT
BED TEMPERATURE	1452.33 DEG F
CA/S MOLE RATIO	3.63
SUPERFICIAL VELOCITY	7.18 FT/SEC
FREEBOARD VELOCITY	3.88 FT/SEC
ACTIVE BED HEIGHT	37.75 IN
BED PRESSURE GRADIENT	1.06 IN H2O/IN BED
GRID PRESSURE DROP	21.38 IN H2O
BED PRESSURE DROP	39.91 IN H2O
BED TUBES FLOW RATE	32027.80 LB/HR
STEAMING RATE	1486.20 LB/HR
RECYCLE SOLIDS	279.54 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	32.50 LB/HR
BED DRAIN SOLIDS	52.00 LB/HR
CYCLONE EFFICIENCY	89.58 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	52.40	911.08	58.03	42.33	15.70
TEST LOOP NO. 2	43.82	941.80	47.60	31.93	15.67
ECONOMIZER	9.09	1212.87	9.22		
SUPERHEATER	19.40	172.79	22.67		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂ PRCT	CO PRCT	CO ₂ PRCT	NOX PPM	SO ₂ PPM
FURNACE OUTLET	5.35	.130	15.06	230.	8.

NOX EMISSIONS (AS FIRED)	.34 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.02 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	265.04 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	9.20 PPM
SULFUR RETENTION	9.16 LB S/HR
SULFUR RETENTION	99.77 PRCT
CALCIUM UTILIZATION	27.47 PRCT

COMBUSTION EFFICIENCY	96.29 PRCT
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PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 12 79
 DATA RECORDED AT 20 44 0

STEADY STATE RUN L-3
 MATRIX TEST POINT NO. 27
 WITH RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	229.40 LB/HR
LIME FEED RATE (AS FIRED)	107.00 LB/HR
TOTAL DRY AIR FLOW	2046.95 LB/HR
PERCENT OF MCR LOAD	98.12 PRCT
THEOR EXCESS AIR	9.67 PRCT
BED TEMPERATURE	1465.68 DEG F
CA/S MOLE RATIO	3.63
SUPERFICIAL VELOCITY	6.33 FT/SEC
FREEBOARD VELOCITY	3.42 FT/SEC
ACTIVE BED HEIGHT	40.09 IN
BED PRESSURE GRADIENT	.89 IN H2O/IN BED
GRID PRESSURE DROP	18.00 IN H2O
BED PRESSURE DROP	35.82 IN H2O
BED TUBES FLOW RATE	32261.12 LB/HR
STEAMING RATE	1448.66 LB/HR
RECYCLE SOLIDS	392.41 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	29.50 LB/HR
BED DRAIN SOLIDS	52.00 LB/HR
CYCLONE EFFICIENCY	93.01 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - DTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	53.02	935.27	58.68	42.71	15.97
TEST LOOP NO. 2	44.36	952.92	48.19	32.25	15.94
ECONOMIZER	9.81	1201.44	9.96		
SUPERHEATER	18.21	169.38	21.12		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂ PRCT	CO PRCT	CO ₂ PRCT	NOX PPM	SO ₂ PPM
FURNACE OUTLET	2.12	.360	18.16	138.	25.

NOX EMISSIONS (AS FIRED)	.18 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.04 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	131.59 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	23.84 PPM
SULFUR RETENTION	9.12 LB S/HR
SULFUR RETENTION	99.38 PRCT
CALCIUM UTILIZATION	27.37 PRCT
COMBUSTION EFFICIENCY	95.14 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 12 79
 DATA RECORDED AT 22 51 0

STEADY STATE RUN L-4
 MATRIX TEST POINT NO. 26
 WITH RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	84.00 LB/HR
TOTAL DRY AIR FLOW	1890.37 LB/HR
PERCENT OF MCR LOAD	77.39 PRCT
THEOR EXCESS AIR	24.53 PRCT
BED TEMPERATURE	1389.08 DEG F
CA/S MOLE RATIO	3.70
SUPERFICIAL VELOCITY	5.49 FT/SEC
FREEBOARD VELOCITY	2.96 FT/SEC
ACTIVE BED HEIGHT	38.08 IN
BED PRESSURE GRADIENT	1.13 IN H2O/IN BED
GRID PRESSURE DROP	11.61 IN H2O
BED PRESSURE DROP	43.02 IN H2O
BED TUBES FLOW RATE	32057.70 LB/HR
STEAMING RATE	1248.14 LB/HR
RECYCLE SOLIDS	271.91 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	24.70 LB/HR
BED DRAIN SOLIDS	28.00 LB/HR
CYCLONE EFFICIENCY	91.67 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	53.23	945.01	58.89	44.47	14.42
TEST LOOP NO. 2	43.77	960.37	47.49	33.09	14.39
ECONOMIZER	9.36	1061.21	9.51		
SUPERHEATER	16.07	151.36	18.60		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.50	.195	13.39	140.	228.

NOX EMISSIONS (AS FIRED)	.21 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.47 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	162.09 PPM
SO2 EMISSIONS (AT 3PRCT O2)	264.15 PPM
SULFUR RETENTION	6.61 LB S/HR
SULFUR RETENTION	93.39 PRCT
CALCIUM UTILIZATION	25.26 PRCT
COMBUSTION EFFICIENCY	95.16 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-5
MATRIX TEST POINT NO. 29
WITH RECYCLE
FREEMAN COAL

DATA RECORDED ON 3 13 79
DATA RECORDED AT 4 48 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.60 LB/HR
LIME FEED RATE (AS FIRED)	139.00 LB/HR
TOTAL DRY AIR FLOW	2661.76 LB/HR
PERCENT OF MCR LOAD	129.93 PRCT
THEOR EXCESS AIR	3.99 PRCT
BED TEMPERATURE	1605.90 DEG F
CA/S MOLE RATIO	3.65
SUPERFICIAL VELOCITY	8.74 FT/SEC
FREEBOARD VELOCITY	4.69 FT/SEC
ACTIVE BED HEIGHT	41.65 IN
BED PRESSURE GRADIENT	.84 IN H2O/IN BED
GRID PRESSURE DROP	30.83 IN H2O
BED PRESSURE DROP	34.94 IN H2O
BED TUBES FLOW RATE	32132.91 LB/HR
STEAMING RATE	1912.94 LB/HR
RECYCLE SOLIDS	336.77 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	34.00 LB/HR
BED DRAIN SOLIDS	43.00 LB/HR
CYCLONE EFFICIENCY	90.83 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	53.31	973.76	58.86	39.76	19.10
TEST LOOP NO. 2	44.39	989.00	48.13	29.06	19.07
ECONOMIZER	11.64	1477.00	11.82		
SUPERHEATER	23.19	210.43	27.07		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	2.59	.230	17.00	260.	80.

NOX EMISSIONS (AS FIRED)	.33 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.14 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	253.65 PPM
SO2 EMISSIONS (AT 3PRCT O2)	78.20 PPM
SULFUR RETENTION	11.63 LB S/HR
SULFUR RETENTION	98.03 PRCT
CALCIUM UTILIZATION	26.87 PRCT
COMBUSTION EFFICIENCY	96.33 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-6
MATRIX TEST POINT NO. 30
WITH RECYCLE
FREEMAN COAL

DATA RECORDED ON 3 14 79
DATA RECORDED AT 1 14 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.60 LB/HR
LIME FEED RATE (AS FIRED)	90.00 LB/HR
TOTAL DRY AIR FLOW	2947.87 LB/HR
PERCENT OF MCR LOAD	127.83 PRCT
THEOR EXCESS AIR	15.87 PRCT
BED TEMPERATURE	1438.48 DEG F
CA/S MOLE RATIO	2.42
SUPERFICIAL VELOCITY	8.96 FT/SEC
FREEBOARD VELOCITY	4.97 FT/SEC
ACTIVE BED HEIGHT	45.79 IN
BED PRESSURE GRADIENT	1.02 IN H2O/IN BED
GRID PRESSURE DROP	33.47 IN H2O
BED PRESSURE DROP	46.68 IN H2O
BED TUBES FLOW RATE	31977.98 LB/HR
STEAMING RATE	1833.03 LB/HR
RECYCLE SOLIDS	392.76 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	39.00 LB/HR
BED DRAIN SOLIDS	78.00 LB/HR
CYCLONE EFFICIENCY	90.97 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	50.31	982.99	55.19	39.80	15.39
TEST LOOP NO. 2	38.47	1066.64	41.10	25.74	15.35
ECONOMIZER	11.07	1444.43	11.24		
SUPERHEATER	26.23	203.76	31.48		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	5.36	.280	14.93	182.	1169.

NOX EMISSIONS (AS FIRED)	.26 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	2.33 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	209.27 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	1345.61 PPM
SULFUR RETENTION	7.75 LB S/HR
SULFUR RETENTION	66.96 PRCT
CALCIUM UTILIZATION	27.64 PRCT
COMBUSTION EFFICIENCY	94.97 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-7

DATA RECORDED ON 3 14 79

MATRIX TEST POINT NO. 36

DATA RECORDED AT 5 30 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.60 LB/HR
LIME FEED RATE (AS FIRED)	90.00 LB/HR
TOTAL DRY AIR FLOW	3128.23 LB/HR
PERCENT OF MCR LOAD	125.57 PRCT
THEOR EXCESS AIR	26.79 PRCT
BED TEMPERATURE	1601.47 DEG F
CA/S MOLE RATIO	2.49
SUPERFICIAL VELOCITY	10.38 FT/SEC
FREEBOARD VELOCITY	5.62 FT/SEC
ACTIVE BED HEIGHT	33.54 IN
BED PRESSURE GRADIENT	.86 IN H2O/IN BED
GRID PRESSURE DROP	43.07 IN H2O
BED PRESSURE DROP	28.68 IN H2O
BED TUBES FLOW RATE	31912.27 LB/HR
STEAMING RATE	1938.02 LB/HR
RECYCLE SOLIDS	347.78 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	45.00 LB/HR
BED DRAIN SOLIDS	25.00 LB/HR
CYCLONE EFFICIENCY	88.54 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	51.21	1013.90	56.15	37.19	18.97
TEST LOOP NO. 2	39.69	1083.95	42.47	23.54	18.92
ECONOMIZER	12.01	1509.07	12.20		
SUPERHEATER	23.53	212.33	27.49		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	7.59	.070	13.94	354.	226.

NOX EMISSIONS (AS FIRED)	.55 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.49 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	475.52 PPM
SO2 EMISSIONS (AT 3PRCT O2)	303.41 PPM
SULFUR RETENTION	10.48 LB S/HR
SULFUR RETENTION	92.96 PRCT
CALCIUM UTILIZATION	37.38 PRCT
COMBUSTION EFFICIENCY	96.59 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-8
MATRIX TEST POINT NO. 35
WITH RECYCLE
FREEMAN COAL

DATA RECORDED ON 3 14 79

DATA RECORDED AT 7 19 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.60 LB/HR
LIME FEED RATE (AS FIRED)	90.00 LB/HR
TOTAL DRY AIR FLOW	2728.27 LB/HR
PERCENT OF MCR LOAD	127.51 PRCT
THEOR EXCESS AIR	8.04 PRCT
BED TEMPERATURE	1635.17 DEG F
CA/S MOLE RATIO	2.36
SUPERFICIAL VELOCITY	9.08 FT/SEC
FREEBOARD VELOCITY	4.86 FT/SEC
ACTIVE BED HEIGHT	33.04 IN
BED PRESSURE GRADIENT	.81 IN H2O/IN BED
GRID PRESSURE DROP	32.54 IN H2O
BED PRESSURE DROP	26.86 IN H2O
BED TUBES FLOW RATE	32006.25 LB/HR
STEAMING RATE	1905.63 LB/HR
RECYCLE SOLIDS	447.90 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	46.00 LB/HR
BED DRAIN SOLIDS	66.00 LB/HR
CYCLONE EFFICIENCY	90.69 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	53.58	1035.79	58.94	39.15	19.78
TEST LOOP NO. 2	42.48	1095.17	45.64	25.91	19.74
ECONOMIZER	12.09	1498.65	12.29		
SUPERHEATER	22.91	209.52	26.70		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.15	.200	16.19	271.	639.

NOX EMISSIONS (AS FIRED)	.35 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	1.16 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	272.97 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	643.87 PPM
SULFUR RETENTION	9.96 LB S/HR
SULFUR RETENTION	83.94 PRCT
CALCIUM UTILIZATION	35.53 PRCT
COMBUSTION EFFICIENCY	95.61 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

DATA RECORDED ON 3 14 79

DATA RECORDED AT 14 41 30

STEADY STATE RUN L-9

MATRIX TEST POINT NO. 34

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	229.40 LB/HR
LIME FEED RATE (AS FIRED)	107.00 LB/HR
TOTAL DRY AIR FLOW	2417.49 LB/HR
PERCENT OF MCR LOAD	99.49 PRCT
THEOR EXCESS AIR	23.61 PRCT
BED TEMPERATURE	1417.43 DEG F
CA/S MOLE RATIO	3.82
SUPERFICIAL VELOCITY	7.16 FT/SEC
FREEBOARD VELOCITY	3.94 FT/SEC
ACTIVE BED HEIGHT	37.14 IN
BED PRESSURE GRADIENT	1.20 IN H2O/IN BED
GRID PRESSURE DROP	19.58 IN H2O
BED PRESSURE DROP	44.72 IN H2O
BED TUBES FLOW RATE	32026.02 LB/HR
STEAMING RATE	1471.94 LB/HR
RECYCLE SOLIDS	238.46 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	19.00 LB/HR
BED DRAIN SOLIDS	60.00 LB/HR
CYCLONE EFFICIENCY	92.62 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	51.61	1034.49	56.57	41.61	14.96
TEST LOOP NO. 2	39.96	1114.71	42.71	27.79	14.92
ECONOMIZER	10.32	1202.22	10.49		
SUPERHEATER	19.61	171.20	22.98		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	6.22	.150	13.44	165.	1132.

NOX EMISSIONS (AS FIRED)	.25 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.35 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	201.37 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1377.54 PPM
SULFUR RETENTION	5.71 LB S/HR
SULFUR RETENTION	65.54 PRCT
CALCIUM UTILIZATION	17.14 PRCT
COMBUSTION EFFICIENCY	96.77 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-10

DATA RECORDED ON 3 14 79

MATRIX TEST POINT NO. 33

DATA RECORDED AT 17 27 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	229.40 LB/HR
LIME FEED RATE (AS FIRED)	107.00 LB/HR
TOTAL DRY AIR FLOW	2082.91 LB/HR
PERCENT OF MCR LOAD	96.87 PRCT
THEOR EXCESS AIR	10.70 PRCT
BED TEMPERATURE	1467.75 DEG F
CA/S MOLE RATIO	3.46
SUPERFICIAL VELOCITY	6.51 FT/SEC
FREEBOARD VELOCITY	3.53 FT/SEC
ACTIVE BED HEIGHT	36.24 IN
BED PRESSURE GRADIENT	1.14 IN H2O/IN BED
GRID PRESSURE DROP	15.83 IN H2O
BED PRESSURE DROP	41.16 IN H2O
BED TUBES FLOW RATE	32220.98 LB/HR
STEAMING RATE	1421.43 LB/HR
RECYCLE SOLIDS	207.31 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	21.00 LB/HR
BED DRAIN SOLIDS	59.00 LB/HR
CYCLONE EFFICIENCY	90.80 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.98	1045.87	55.77	39.78	15.99
TEST LOOP NO. 2	40.09	1124.22	42.84	26.89	15.95
ECONOMIZER	9.74	1167.03	9.90		
SUPERHEATER	17.94	166.71	20.81		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	2.93	.430	17.85	147.	439.

NOX EMISSIONS (AS FIRED)	.20 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.82 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	146.33 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	436.80 PPM
SULFUR RETENTION	8.61 LB S/HR
SULFUR RETENTION	89.41 PRCT
CALCIUM UTILIZATION	25.85 PRCT
COMBUSTION EFFICIENCY	95.54 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-11
MATRIX TEST POINT NO. 32
WITH RECYCLE
FREEMAN COAL

DATA RECORDED ON 3 14 79
DATA RECORDED AT 20 12 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	84.00 LB/HR
TOTAL DRY AIR FLOW	1939.63 LB/HR
PERCENT OF MCR LOAD	77.78 PRCT
THEOR EXCESS AIR	27.39 PRCT
BED TEMPERATURE	1428.37 DEG F
CA/S MOLE RATIO	3.80
SUPERFICIAL VELOCITY	5.79 FT/SEC
FREEBOARD VELOCITY	3.11 FT/SEC
ACTIVE BED HEIGHT	34.85 IN
BED PRESSURE GRADIENT	1.22 IN H2O/IN BED
GRID PRESSURE DROP	10.86 IN H2O
BED PRESSURE DROP	42.49 IN H2O
BED TUBES FLOW RATE	32286.27 LB/HR
STEAMING RATE	1218.18 LB/HR
RECYCLE SOLIDS	190.36 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	21.00 LB/HR
BED DRAIN SOLIDS	59.00 LB/HR
CYCLONE EFFICIENCY	90.06 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	51.14	1059.10	55.92	40.74	15.17
TEST LOOP NO. 2	39.85	1131.52	42.57	27.42	15.14
ECONOMIZER	9.33	1038.89	9.49		
SUPERHEATER	16.10	147.88	18.70		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.01	.150	15.23	168.	370.

NOX EMISSIONS (AS FIRED)	.26 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.79 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	189.23 PPM
SO2 EMISSIONS (AT 3PRCT O2)	416.51 PPM
SULFUR RETENTION	6.10 LB S/HR
SULFUR RETENTION	88.49 PRCT
CALCIUM UTILIZATION	23.32 PRCT
COMBUSTION EFFICIENCY	95.63 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-12

DATA RECORDED ON 3 14 79

MATRIX TEST POINT NO. 31

DATA RECORDED AT 23 23 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	84.00 LB/HR
TOTAL DRY AIR FLOW	1610.23 LB/HR
PERCENT OF MCR LOAD	79.56 PRCT
THEOR EXCESS AIR	6.38 PRCT
BED TEMPERATURE	1448.67 DEG F
CA/S MOLE RATIO	3.61
SUPERFICIAL VELOCITY	4.96 FT/SEC
FREEBOARD VELOCITY	2.63 FT/SEC
ACTIVE BED HEIGHT	34.54 IN
BED PRESSURE GRADIENT	1.04 IN H2O/IN BED
GRID PRESSURE DROP	10.08 IN H2O
BED PRESSURE DROP	36.06 IN H2O
BED TUBES FLOW RATE	32211.57 LB/HR
STEAMING RATE	1127.64 LB/HR
RECYCLE SOLIDS	163.64 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	17.00 LB/HR
BED DRAIN SOLIDS	40.00 LB/HR
CYCLONE EFFICIENCY	90.59 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	51.40	1080.89	56.16	40.57	15.58
TEST LOOP NO. 2	39.22	1142.75	41.83	26.28	15.55
ECONOMIZER	8.59	979.62	8.72		
SUPERHEATER	14.78	139.12	17.09		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	2.39	.500	18.19	129.	336.

NOX EMISSIONS (AS FIRED)	.16 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.59 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	124.77 PPM
SO2 EMISSIONS (AT 3PRCT O2)	324.50 PPM
SULFUR RETENTION	6.65 LB S/HR
SULFUR RETENTION	91.70 PRCT
CALCIUM UTILIZATION	25.43 PRCT
COMBUSTION EFFICIENCY	95.29 PRCT

PRELIMINARY SSU DATA ANALYSIS

STEADY STATE RUN L-13
MATRIX TEST POINT NO. 38
WITH RECYCLE
FREEMAN COAL

PROGRAM VERSION: SSU77
DATA RECORDED ON 3 15 79
DATA RECORDED AT 2 28 40

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	84.00 LB/HR
TOTAL DRY AIR FLOW	1532.57 LB/HR
PERCENT OF MCR LOAD	77.19 PRCT
THEOR EXCESS AIR	1.02 PRCT
BED TEMPERATURE	1457.83 DEG F
CA/S MOLE RATIO	3.61
SUPERFICIAL VELOCITY	4.76 FT/SEC
FREEBOARD VELOCITY	2.54 FT/SEC
ACTIVE BED HEIGHT	31.18 IN
BED PRESSURE GRADIENT	.93 IN H2O/IN BED
GRID PRESSURE DROP	9.64 IN H2O
BED PRESSURE DROP	29.12 IN H2O
BED TUBES FLOW RATE	32344.93 LB/HR
STEAMING RATE	1094.70 LB/HR
RECYCLE SOLIDS	240.28 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	21.00 LB/HR
BED DRAIN SOLIDS	73.00 LB/HR
CYCLONE EFFICIENCY	91.96 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.98	914.91	56.28	40.49	15.79
TEST LOOP NO. 2	39.63	920.68	42.75	26.99	15.76
ECONOMIZER	9.50	984.56	9.66		
SUPERHEATER	15.26	135.13	17.82		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	1.47	.560	18.44	147.	40.

NOX EMISSIONS (AS FIRED)	.18 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.07 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	135.13 PPM
SO2 EMISSIONS (AT 3PRCT O2)	36.87 PPM
SULFUR RETENTION	7.19 LB S/HR
SULFUR RETENTION	99.07 PRCT
CALCIUM UTILIZATION	27.48 PRCT
COMBUSTION EFFICIENCY	93.99 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 15 79
 DATA RECORDED AT 4 0 40

STEADY STATE RUN L-14
 MATRIX TEST POINT NO. 37
 WITH RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	84.00 LB/HR
TOTAL DRY AIR FLOW	1474.38 LB/HR
PERCENT OF MCR LOAD	77.59 PRCT
THEOR EXCESS AIR	-9.82 PRCT
BED TEMPERATURE	1456.40 DEG F
CA/S MOLE RATIO	3.61
SUPERFICIAL VELOCITY	4.59 FT/SEC
FREEBOARD VELOCITY	2.46 FT/SEC
ACTIVE BED HEIGHT	27.56 IN
BED PRESSURE GRADIENT	.97 IN H2O/IN BED
GRID PRESSURE DROP	8.70 IN H2O
BED PRESSURE DROP	26.68 IN H2O
BED TUBES FLOW RATE	32055.30 LB/HR
STEAMING RATE	1082.49 LB/HR
RECYCLE SOLIDS	335.35 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	30.00 LB/HR
BED DRAIN SOLIDS	40.00 LB/HR
CYCLONE EFFICIENCY	91.79 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.25	926.74	55.35	39.59	15.76
TEST LOOP NO. 2	39.64	930.05	42.74	27.01	15.73
ECONOMIZER	9.25	956.92	9.41		
SUPERHEATER	15.65	133.79	18.38		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂ PRCT	CO PRCT	CO ₂ PRCT	NOX PPM	SO ₂ PPM
FURNACE OUTLET	.81	.600	18.65	183.	40.

NOX EMISSIONS (AS FIRED)	.21 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.07 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	163.42 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	35.66 PPM
SULFUR RETENTION	7.19 LB S/HR
SULFUR RETENTION	99.11 PRCT
CALCIUM UTILIZATION	27.49 PRCT
COMBUSTION EFFICIENCY	91.88 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-15

DATA RECORDED ON 3 15 79

MATRIX TEST POINT NO. 39

DATA RECORDED AT 7 13 55

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	84.00 LB/HR
TOTAL DRY AIR FLOW	1751.72 LB/HR
PERCENT OF MCR LOAD	76.11 PRCT
THEOR EXCESS AIR	16.71 PRCT
BED TEMPERATURE	1400.33 DEG F
CA/S MOLE RATIO	3.70
SUPERFICIAL VELOCITY	5.21 FT/SEC
FRFRFRFRFR VELOCITY	2.86 FT/SEC
ACTIVE BED HEIGHT	25.60 IN
BED PRESSURE GRADIENT	1.02 IN H2O/IN BED
GRID PRESSURE DROP	12.31 IN H2O
BED PRESSURE DROP	26.07 IN H2O
BED TUBES FLOW RATE	31686.33 LB/HR
STEAMING RATE	1136.28 LB/HR
RECYCLE SOLIDS	389.67 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	30.00 LB/HR
BED DRAIN SOLIDS	56.00 LB/HR
CYCLONE EFFICIENCY	92.85 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

	HEAT TRANSFER COEFFICIENTS - BTU/HR FT ² DEG F				
	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	49.14	944.97	53.93	39.31	14.62
TEST LOOP NO. 2	37.07	940.00	39.74	25.14	14.59
ECONOMIZER	9.66	1000.15	9.82		
SUPERHEATER	17.67	139.27	21.06		

	DRY STACK GAS STREAM COMPOSITIONS				
	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.97	.400	15.98	127.	1249.

NOX EMISSIONS (AS FIRED)	.18 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	2.47 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	134.68 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	1320.33 PPM
SULFUR RETENTION	4.66 LB S/HR
SULFUR RETENTION	65.80 PRCT
CALCIUM UTILIZATION	17.79 PRCT
COMBUSTION EFFICIENCY	93.21 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-16
MATRIX TEST POINT NO. 40
WITH RECYCLE
FREEMAN COAL

DATA RECORDED ON 3 15 79
DATA RECORDED AT 9 50 1

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	84.00 LB/HR
TOTAL DRY AIR FLOW	1895.36 LB/HR
PERCENT OF MCR LOAD	80.55 PRCT
THEOR EXCESS AIR	21.60 PRCT
BED TEMPERATURE	1432.60 DEG F
CA/S MOLE RATIO	3.78
SUPERFICIAL VELOCITY	5.75 FT/SEC
FREEBOARD VELOCITY	3.09 FT/SEC
ACTIVE BED HEIGHT	25.63 IN
BED PRESSURE GRADIENT	1.01 IN H2O/IN BED
GRID PRESSURE DROP	14.56 IN H2O
BED PRESSURE DROP	25.90 IN H2O
BED TUBES FLOW RATE	31763.49 LB/HR
STEAMING RATE	1104.37 LB/HR
RECYCLE SOLIDS	292.93 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	19.00 LB/HR
BED DRAIN SOLIDS	41.00 LB/HR
CYCLONE EFFICIENCY	93.91 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	47.24	959.68	51.59	36.34	15.26
TEST LOOP NO. 2	35.79	949.86	38.25	23.02	15.23
ECONOMIZER	9.17	978.92	9.33		
SUPERHEATER	16.36	135.94	19.31		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.64	.200	15.69	211.	670.

NOX EMISSIONS (AS FIRED)	.31 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.38 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	247.58 PPM
SO2 EMISSIONS (AT 3PRCT O2)	784.44 PPM
SULFUR RETENTION	5.47 LB S/HR
SULFUR RETENTION	79.35 PRCT
CALCIUM UTILIZATION	20.99 PRCT
COMBUSTION EFFICIENCY	96.26 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 15 79
 DATA RECORDED AT 11 50 0

STEADY STATE RUN L-17
 MATRIX TEST POINT NO. 41
 WITH RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	84.00 LB/HR
TOTAL DRY AIR FLOW	2045.50 LB/HR
PERCENT OF MCR LOAD	78.28 PRCT
THEOR EXCESS AIR	32.62 PRCT
BED TEMPERATURE	1457.67 DEG F
CA/S MOLE RATIO	3.59
SUPERFICIAL VELOCITY	6.31 FT/SEC
FREEBOARD VELOCITY	3.31 FT/SEC
ACTIVE BED HEIGHT	26.63 IN
BED PRESSURE GRADIENT	.83 IN H2O/IN BED
GRID PRESSURE DROP	18.75 IN H2O
BED PRESSURE DROP	22.14 IN H2O
BED TUBES FLOW RATE	31798.70 LB/HR
STEAMING RATE	1123.66 LB/HR
RECYCLE SOLIDS	264.24 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	17.00 LB/HR
BED DRAIN SOLIDS	30.00 LB/HR
CYCLONE EFFICIENCY	93.96 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	45.66	968.33	49.69	33.93	15.76
TEST LOOP NO. 2	35.37	952.47	37.76	22.02	15.74
ECONOMIZER	9.28	997.64	9.43		
SUPERHEATER	16.18	137.86	19.02		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	6.85	.140	15.03	271.	238.

NOX EMISSIONS (AS FIRED)	.45 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.55 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	345.24 PPM
SO2 EMISSIONS (AT 3PRCT O2)	302.76 PPM
SULFUR RETENTION	6.71 LB S/HR
SULFUR RETENTION	92.43 PRCT
CALCIUM UTILIZATION	25.77 PRCT
COMBUSTION EFFICIENCY	96.91 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-18

DATA RECORDED ON 3 15 79

MATRIX TEST POINT NO. 42

DATA RECORDED AT 14 59 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	229.40 LB/HR
LIME FEED RATE (AS FIRED)	107.00 LB/HR
TOTAL DRY AIR FLOW	1867.07 LB/HR
PERCENT OF MCR LOAD	97.74 PRCT
THEOR EXCESS AIR	-2.85 PRCT
BED TEMPERATURE	1570.93 DEG F
CA/S MOLE RATIO	3.59
SUPERFICIAL VELOCITY	6.16 FT/SEC
FREEBOARD VELOCITY	3.26 FT/SEC
ACTIVE BED HEIGHT	26.49 IN
BED PRESSURE GRADIENT	.85 IN H2O/IN BED
GRID PRESSURE DROP	14.82 IN H2O
BED PRESSURE DROP	22.57 IN H2O
BED TUBES FLOW RATE	32194.51 LB/HR
STEAMING RATE	1388.69 LB/HR
RECYCLE SOLIDS	353.90 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	26.00 LB/HR
BED DRAIN SOLIDS	33.00 LB/HR
CYCLONE EFFICIENCY	93.16 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	49.29	973.91	53.99	35.73	18.26
TEST LOOP NO. 2	38.65	950.12	41.54	23.31	18.23
ECONOMIZER	10.30	1169.90	10.47		
SUPERHEATER	18.84	163.42	22.11		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	1.37	.500	18.60	220.	37.

NOX EMISSIONS (AS FIRED)	.26 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.06 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	202.01 PPM
SO2 EMISSIONS (AT 3PRCT O2)	33.47 PPM
SULFUR RETENTION	9.10 LB S/HR
SULFUR RETENTION	99.18 PRCT
CALCIUM UTILIZATION	27.65 PRCT
COMBUSTION EFFICIENCY	95.30 PRCT

PRELIMINARY SSU DATA ANALYSIS

STEADY STATE RUN L-19
MATRIX TEST POINT NO. 43
WITH RECYCLE
FREEMAN COAL

PROGRAM VERSION: SSU77
DATA RECORDED ON 3 15 79
DATA RECORDED AT 17 46 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	229.40 LB/HR
LIME FEED RATE (AS FIRED)	107.00 LB/HR
TOTAL DRY AIR FLOW	2043.58 LB/HR
PERCENT OF MCR LOAD	98.74 PRCT
THEOR EXCESS AIR	7.35 PRCT
BED TEMPERATURE	1455.03 DEG F
CA/S MOLE RATIO	3.80
SUPERFICIAL VELOCITY	6.28 FT/SEC
FREEBOARD VELOCITY	3.45 FT/SEC
ACTIVE BED HEIGHT	27.65 IN
BED PRESSURE GRADIENT	.87 IN H2O/IN BED
GRID PRESSURE DROP	18.09 IN H2O
BED PRESSURE DROP	24.11 IN H2O
BED TUBES FLOW RATE	32263.27 LB/HR
STEAMING RATE	1445.06 LB/HR
RECYCLE SOLIDS	452.57 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	31.00 LB/HR
BED DRAIN SOLIDS	46.00 LB/HR
CYCLONE EFFICIENCY	93.59 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.23	986.80	55.08	39.35	15.73
TEST LOOP NO. 2	38.90	955.73	41.81	26.10	15.71
ECONOMIZER	10.86	1211.74	11.04		
SUPERHEATER	20.77	168.67	24.66		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	2.73	.300	17.79	198.	80.

NOX EMISSIONS (AS FIRED)	.25 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.14 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	194.63 PPM
SO2 EMISSIONS (AT 3PRCT O2)	78.80 PPM
SULFUR RETENTION	0.54 LB S/HR
SULFUR RETENTION	97.92 PRCT
CALCIUM UTILIZATION	25.74 PRCT
COMBUSTION EFFICIENCY	95.10 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-20

DATA RECORDED ON 3 15 79

MATRIX TEST POINT NO. 44

DATA RECORDED AT 22 2 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	229.40 LB/HR
LIME FEED RATE (AS FIRED)	107.00 LB/HR
TOTAL DRY AIR FLOW	2245.68 LB/HR
PERCENT OF MCR LOAD	101.11 PRCT
THEOR EXCESS AIR	12.73 PRCT
BED TEMPERATURE	1399.67 DEG F
CA/S MOLE RATIO	3.80
SUPERFICIAL VELOCITY	6.66 FT/SEC
FREEBOARD VELOCITY	3.71 FT/SEC
ACTIVE BED HEIGHT	26.22 IN
BED PRESSURE GRADIENT	.97 IN H2O/IN BED
GRID PRESSURE DROP	21.17 IN H2O
BED PRESSURE DROP	25.34 IN H2O
BED TUBES FLOW RATE	31777.35 LB/HR
STEAMING RATE	1393.23 LB/HR
RECYCLE SOLIDS	346.33 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	27.00 LB/HR
BED DRAIN SOLIDS	62.00 LB/HR
CYCLONE EFFICIENCY	92.77 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	46.52	1018.86	50.55	35.96	14.60
TEST LOOP NO. 2	35.54	975.73	37.92	23.35	14.58
ECONOMIZER	10.59	1175.14	10.77		
SUPERHEATER	21.24	164.07	25.47		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.38	.350	15.07	157.	1639.

NOX EMISSIONS (AS FIRED)	.22 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	3.15 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	181.09 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1887.55 PPM
SULFUR RETENTION	4.62 LB S/HR
SULFUR RETENTION	53.03 PRCT
CALCIUM UTILIZATION	13.94 PRCT
COMBUSTION EFFICIENCY	95.09 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-21

DATA RECORDED ON 3 16 79

MATRIX TEST POINT NO. 45

DATA RECORDED AT 0 48 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	229.40 LB/HR
LIME FEED RATE (AS FIRED)	107.00 LB/HR
TOTAL DRY AIR FLOW	2436.49 LB/HR
PERCENT OF MCR LOAD	99.37 PRCT
THEOR EXCESS AIR	25.27 PRCT
DCD TEMPERATURE	1442.07 DEG F
CA/S MOLE RATIO	4.25
SUPERFICIAL VELOCITY	7.42 FT/SEC
FREEBOARD VELOCITY	4.05 FT/SEC
ACTIVE BED HEIGHT	25.67 IN
BED PRESSURE GRADIENT	.91 IN H2O/IN BED
GRID PRESSURE DROP	26.15 IN H2O
BED PRESSURE DROP	23.37 IN H2O
BED TUBES FLOW RATE	31702.67 LB/HR
STEAMING RATE	1369.28 LB/HR
RECYCLE SOLIDS	255.28 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	27.00 LB/HR
BED DRAIN SOLIDS	69.00 LB/HR
CYCLONE EFFICIENCY	90.44 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	43.82	1041.69	47.32	31.88	15.44
TEST LOOP NO. 2	34.20	991.63	36.37	20.95	15.42
ECONOMIZER	9.79	1163.34	9.95		
SUPERHEATER	19.17	161.37	22.61		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	6.42	.180	14.93	233.	641.

NOX EMISSIONS (AS FIRED)	.36 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.37 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	288.10 PPM
SO2 EMISSIONS (AT 3PRCT O2)	790.61 PPM
SULFUR RETENTION	6.05 LB S/HR
SULFUR RETENTION	77.56 PRCT
CALCIUM UTILIZATION	18.24 PRCT
COMBUSTION EFFICIENCY	95.85 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-22

DATA RECORDED ON 3 16 79

MATRIX TEST POINT NO. 52

DATA RECORDED AT 5 17 30

NO RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	229.40 LB/HR
LIME FEED RATE (AS FIRED)	53.00 LB/HR
TOTAL DRY AIR FLOW	2454.85 LB/HR
PERCENT OF MCR LOAD	96.99 PRCT
THEOR EXCESS AIR	28.28 PRCT
BED TEMPERATURE	1716.13 DEG F
CA/S MOLE RATIO	1.79
SUPERFICIAL VELOCITY	8.42 FT/SEC
FREEBOARD VELOCITY	4.13 FT/SEC
ACTIVE BED HEIGHT	26.83 IN
BED PRESSURE GRADIENT	.86 IN H2O/IN. BED
GRID PRESSURE DROP	26.14 IN H2O
BED PRESSURE DROP	23.01 IN H2O
BED TUBES FLOW RATE	32189.19 LB/HR
STEAMING RATE	1397.52 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	39.00 LB/HR
BAGHOUSE SOLIDS	4.00 LB/HR
BED DRAIN SOLIDS	18.00 LB/HR
CYCLONE EFFICIENCY	90.70 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	48.68	1085.38	52.91	31.12	21.79
TEST LOOP NO. 2	42.78	1024.88	46.15	24.37	21.79
ECONOMIZER	9.23	1166.73	9.36		
SUPERHEATER	16.88	164.73	19.43		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂ PRCT	CO PRCT	CO ₂ PRCT	NOX PPM	SO ₂ PPM
FURNACE OUTLET	6.57	.250	12.79	382.	1121.

NOX EMISSIONS (AS FIRED)	.59 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	2.42 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	476.47 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	1398.58 PPM
SULFUR RETENTION	6.16 LB S/HR
SULFUR RETENTION	67.13 PRCT
CALCIUM UTILIZATION	37.51 PRCT
COMBUSTION EFFICIENCY	96.34 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-23
MATRIX TEST POINT NO. 50
NO RECYCLE
FREEMAN COAL

DATA RECORDED ON 3 16 79
DATA RECORDED AT 9 45 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	41.00 LB/HR
TOTAL DRY AIR FLOW	1929.37 LB/HR
PERCENT OF MCR LOAD	76.01 PRCT
THEOR EXCESS AIR	31.64 PRCT
BED TEMPERATURE	1653.63 DEG F
CA/S MOLE RATIO	1.67
SUPERFICIAL VELOCITY	6.43 FT/SEC
FREEDBOARD VELOCITY	3.11 FT/SEC
ACTIVE BED HEIGHT	27.33 IN
BED PRESSURE GRADIENT	.97 IN H2O/IN BED
GRID PRESSURE DROP	14.31 IN H2O
BED PRESSURE DROP	26.55 IN H2O
BED TUBES FLOW RATE	32373.73 LB/HR
STEAMING RATE	1178.73 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	25.00 LB/HR
BAGHOUSE SOLIDS	2.50 LB/HR
BED DRAIN SOLIDS	28.00 LB/HR
CYCLONE EFFICIENCY	90.91 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.02	929.55	55.05	34.81	20.25
TEST LOOP NO. 2	44.00	953.00	47.78	27.56	20.22
ECONOMIZER	7.41	995.58	7.51		
SUPERHEATER	12.91	145.91	14.55		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.67	.055	13.98	334.	810.

NOX EMISSIONS (AS FIRED)	.52 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.75 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	392.16 PPM
SO2 EMISSIONS (AT 3PRCT O2)	950.77 PPM
SULFUR RETENTION	5.91 LB S/HR
SULFUR RETENTION	77.51 PRCT
CALCIUM UTILIZATION	46.48 PRCT
COMBUSTION EFFICIENCY	95.38 PRCT

PRELIMINARY SSU DATA ANALYSIS

STEADY STATE RUN L-24
MATRIX TEST POINT NO. 49
NO RECYCLE
FREEMAN COAL

PROGRAM VERSION: SSU77
DATA RECORDED ON 3 16 77
DATA RECORDED AT 11 40 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	181.40 LB/HR
LIME FEED RATE (AS FIRED)	41.00 LB/HR
TOTAL DRY AIR FLOW	1846.50 LB/HR
PERCENT OF MCR LOAD	75.51 PRCT
THEOR EXCESS AIR	23.51 PRCT
BED TEMPERATURE	1645.13 DEG F
CA/S MOLE RATIO	1.80
SUPERFICIAL VELOCITY	6.15 FT/SEC
FREEBOARD VELOCITY	2.96 FT/SEC
ACTIVE BED HEIGHT	28.25 IN
BED PRESSURE GRADIENT	.87 IN H2O/IN BED
GRID PRESSURE DROP	14.67 IN H2O
BED PRESSURE DROP	24.66 IN H2O
BED TUBES FLOW RATE	32279.87 LB/HR
STEAMING RATE	1162.81 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	24.50 LB/HR
BAGHOUSE SOLIDS	3.50 LB/HR
BED DRAIN SOLIDS	37.00 LB/HR
CYCLONE EFFICIENCY	87.50 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.77	947.87	55.88	35.85	20.04
TEST LOOP NO. 2	43.80	964.59	47.50	27.49	20.01
ECONOMIZER	7.21	989.10	7.31		
SUPERHEATER	12.55	144.58	14.10		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.24	.100	14.32	312.	864.

NOX EMISSIONS (AS FIRED)	.47 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.80 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	355.89 PPM
SO2 EMISSIONS (AT 3PRCT O2)	986.23 PPM
SULFUR RETENTION	5.33 LB S/HR
SULFUR RETENTION	75.30 PRCT
CALCIUM UTILIZATION	41.93 PRCT
COMBUSTION EFFICIENCY	95.81 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-25
MATRIX TEST POINT NO. 48
WITH RECYCLE
FREEMAN COAL

DATA RECORDED ON 3 16 79
DATA RECORDED AT 15 39 30

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.60 LB/HR
LIME FEED RATE (AS FIRED)	139.00 LB/HR
TOTAL DRY AIR FLOW	3103.10 LB/HR
PERCENT OF MCR LOAD	123.79 PRCT
THEOR EXCESS AIR	26.76 PRCT
BED TEMPERATURE	1589.17 DEG F
CA/S MOLE RATIO	3.72
SUPERFICIAL VELOCITY	10.08 FT/SEC
FREEBOARD VELOCITY	5.45 FT/SEC
ACTIVE BED HEIGHT	27.57 IN
BED PRESSURE GRADIENT	.74 IN H2O/IN BED
GRID PRESSURE DROP	45.26 IN H2O
BED PRESSURE DROP	20.31 IN H2O
BED TUBES FLOW RATE	32038.16 LB/HR
STEAMING RATE	1934.80 LB/HR
RECYCLE SOLIDS	509.50 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	65.00 LB/HR
BED DRAIN SOLIDS	59.00 LB/HR
CYCLONE EFFICIENCY	88.69 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	52.58	978.97	57.95	39.25	18.71
TEST LOOP NO. 2	45.46	980.80	49.41	30.72	18.69
ECONOMIZER	12.15	1544.48	12.34		
SUPERHEATER	25.38	213.03	30.02		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	4.27	.150	15.78	319.	86.

NOX EMISSIONS (AS FIRED)	.49 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.18 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	343.22 PPM
SO2 EMISSIONS (AT 3PRCT O2)	92.50 PPM
SULFUR RETENTION	11.27 LB S/HR
SULFUR RETENTION	97.46 PRCT
CALCIUM UTILIZATION	26.17 PRCT
COMBUSTION EFFICIENCY	95.50 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-26

DATA RECORDED ON 3 16 79

MATRIX TEST POINT NO. 47

DATA RECORDED AT 18 35 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.60 LB/HR
LIME FEED RATE (AS FIRED)	139.00 LB/HR
TOTAL DRY AIR FLOW	2964.65 LB/HR
PERCENT OF MCR LOAD	128.96 PRCT
THEOR EXCESS AIR	18.02 PRCT
BED TEMPERATURE	1541.37 DEG F
CA/S MOLE RATIO	3.72
SUPERFICIAL VELOCITY	9.49 FT/SEC
FREEBOARD VELOCITY	5.15 FT/SEC
ACTIVE BED HEIGHT	27.35 IN
BED PRESSURE GRADIENT	.72 IN H2O/IN BED
GRID PRESSURE DROP	40.17 IN H2O
BED PRESSURE DROP	19.79 IN H2O
BED TUBES FLOW RATE	32093.68 LB/HR
STEAMING RATE	1812.44 LB/HR
RECYCLE SOLIDS	513.06 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	52.00 LB/HR
BED DRAIN SOLIDS	69.00 LB/HR
CYCLONE EFFICIENCY	90.80 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	53.67	881.65	59.75	42.64	17.10
TEST LOOP NO. 2	45.64	886.48	49.94	32.86	17.08
ECONOMIZER	14.31	1424.50	14.59		
SUPERHEATER	25.62	202.85	30.63		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	4.32	.130	16.14	307.	16.

NOX EMISSIONS (AS FIRED)	.44 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.03 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	331.02 PPM
SO2 EMISSIONS (AT 3PRCT O2)	17.27 PPM
SULFUR RETENTION	11.51 LB S/HR
SULFUR RETENTION	99.55 PRCT
CALCIUM UTILIZATION	26.73 PRCT
COMBUSTION EFFICIENCY	95.56 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-27

DATA RECORDED ON 3 16 79

MATRIX TEST POINT NO. 46

DATA RECORDED AT 20 31 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.60 LB/HR
LIME FEED RATE (AS FIRED)	139.00 LB/HR
TOTAL DRY AIR FLOW	2771.61 LB/HR
PERCENT OF MCR LOAD	128.63 PRCT
THEOR EXCESS AIR	8.69 PRCT
BED TEMPERATURE	1554.20 DEG F
CA/S MOLE RATIO	3.54
SUPERFICIAL VELOCITY	8.98 FT/SEC
FREEBOARD VELOCITY	4.89 FT/SEC
ACTIVE BED HEIGHT	27.01 IN
BED PRESSURE GRADIENT	.79 IN H2O/IN BED
GRID PRESSURE DROP	33.71 IN H2O
BED PRESSURE DROP	21.46 IN H2O
BED TUBES FLOW RATE	32045.75 LB/HR
STEAMING RATE	1786.25 LB/HR
RECYCLE SOLIDS	474.84 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	48.50 LB/HR
BED DRAIN SOLIDS	64.00 LB/HR
CYCLONE EFFICIENCY	90.73 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	54.31	869.36	60.62	43.31	17.30
TEST LOOP NO. 2	46.43	867.62	51.21	33.92	17.28
ECONOMIZER	14.36	1386.30	14.65		
SUPERHEATER	24.85	201.10	29.58		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂ PRCT	CO PRCT	CO ₂ PRCT	NOX PPM	SO ₂ PPM
FURNACE OUTLET	2.85	.290	17.40	274.	305.

NOX EMISSIONS (AS FIRED)	.36 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.57 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	271.20 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	302.44 PPM
SULFUR RETENTION	11.22 LB S/HR
SULFUR RETENTION	92.30 PRCT
CALCIUM UTILIZATION	26.06 PRCT
COMBUSTION EFFICIENCY	95.24 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-28

DATA RECORDED ON 3 19 79

BASELINE TEST POINT

DATA RECORDED AT 14 16 0

NO RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	247.07 LB/HR
LIME FEED RATE (AS FIRED)	104.40 LB/HR
TOTAL DRY AIR FLOW	2456.52 LB/HR
PERCENT OF MCR LOAD	104.33 PRCT
THEOR EXCESS AIR	19.29 PRCT
BED TEMPERATURE	1405.95 DEG F
CA/S MOLE RATIO	3.54
SUPERFICIAL VELOCITY	7.28 FT/SEC
FREEBOARD VELOCITY	4.04 FT/SEC
ACTIVE BED HEIGHT	42.78 IN
BED PRESSURE GRADIENT	1.01 IN H2O/IN BED
GRID PRESSURE DROP	27.06 IN H2O
BED PRESSURE DROP	43.04 IN H2O
BED TUBES FLOW RATE	31972.24 LB/HR
STEAMING RATE	1452.14 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	39.50 LB/HR
BAGHOUSE SOLIDS	10.00 LB/HR
BED DRAIN SOLIDS	64.00 LB/HR
CYCLONE EFFICIENCY	79.80 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	52.32	756.25	58.85	44.39	14.45
TEST LOOP NO. 2	43.17	793.13	47.35	32.94	14.42
ECONOMIZER	8.26	1129.74	8.37		
SUPERHEATER	20.02	169.52	23.59		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.84	.220	13.98	224.	995.

NOX EMISSIONS (AS FIRED)	.32 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.01 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	265.84 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1181.99 PPM
SULFUR RETENTION	6.45 LB S/HR
SULFUR RETENTION	70.54 PRCT
CALCIUM UTILIZATION	19.93 PRCT
COMBUSTION EFFICIENCY	93.59 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-29

DATA RECORDED ON 3 19 79

MATRIX TEST POINT NO. 25

DATA RECORDED AT 20 45 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	177.70 LB/HR
LIME FEED RATE (AS FIRED)	75.60 LB/HR
TOTAL DRY AIR FLOW	1642.21 LB/HR
PERCENT OF MCR LOAD	76.20 PRCT
THEOR EXCESS AIR	9.08 PRCT
BED TEMPERATURE	1439.00 DEG F
CA/S MOLE RATIO	3.38
SUPERFICIAL VELOCITY	5.00 FT/SEC
FREESBOARD VELOCITY	2.65 FT/SEC
ACTIVE BED HEIGHT	41.68 IN
BED PRESSURE GRADIENT	1.02 IN H2O/IN BED
GRID PRESSURE DROP	12.14 IN H2O
BED PRESSURE DROP	42.51 IN H2O
BED TUBES FLOW RATE	32231.87 LB/HR
STEAMING RATE	1127.65 LB/HR
RECYCLE SOLIDS	172.45 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	54.00 LB/HR
BED DRAIN SOLIDS	72.00 LB/HR
CYCLONE EFFICIENCY	76.15 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	49.59	898.37	54.66	39.44	15.22
TEST LOOP NO. 2	38.97	903.47	42.02	26.83	15.19
ECONOMIZER	6.97	926.29	7.07		
SUPERHEATER	13.91	140.02	15.93		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	2.64	.580	17.01	114.	612.

NOX EMISSIONS (AS FIRED)	.15 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.13 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	112.07 PPM
SO2 EMISSIONS (AT 3PRCT O2)	599.59 PPM
SULFUR RETENTION	5.82 LB S/HR
SULFUR RETENTION	84.01 PRCT
CALCIUM UTILIZATION	24.85 PRCT
COMBUSTION EFFICIENCY	88.34 PRCT

PRELIMINARY SSU DATA ANALYSIS

STEADY STATE RUN L-30
MATRIX TEST POINT NO. 58
WITH RECYCLE
FREEMAN COAL

PROGRAM VERSION: 98U77
DATA RECORDED ON 3 20 79
DATA RECORDED AT 3 0 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	227.25 LB/HR
LIME FEED RATE (AS FIRED)	47.70 LB/HR
TOTAL DRY AIR FLOW	2471.93 LB/HR
PERCENT OF MCR LOAD	96.70 PRCT
THEOR EXCESS AIR	29.90 PRCT
BED TEMPERATURE	1407.20 DEG F
CA/S MOLE RATIO	1.76
SUPERFICIAL VELOCITY	7.33 FT/SEC
FREEBOARD VELOCITY	4.03 FT/SEC
ACTIVE BED HEIGHT	37.59 IN
BED PRESSURE GRADIENT	1.10 IN H2O/IN BED
GRID PRESSURE DROP	23.27 IN H2O
BED PRESSURE DROP	41.24 IN H2O
BED TUBES FLOW RATE	32058.82 LB/HR
STEAMING RATE	1377.59 LB/HR
RECYCLE SOLIDS	434.05 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	32.00 LB/HR
BED DRAIN SOLIDS	116.00 LB/HR
CYCLONE EFFICIENCY	93.13 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	48.20	928.92	52.85	38.34	14.51
TEST LOOP NO. 2	37.02	900.59	39.77	25.28	14.49
ECONOMIZER	10.82	1138.52	11.01		
SUPERHEATER	18.10	162.25	21.12		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	6.77	.220	13.30	190.	1292.

NOX EMISSIONS (AS FIRED)	.30 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.84 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	239.96 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1633.66 PPM
SULFUR RETENTION	4.88 LB S/HR
SULFUR RETENTION	58.04 PRCT
CALCIUM UTILIZATION	33.02 PRCT
COMBUSTION EFFICIENCY	94.46 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 20 79
 DATA RECORDED AT 5 27 0

STEADY STATE RUN L-31
 MATRIX TEST POINT NO. 57
 WITH RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	227.25 LB/HR
LIME FEED RATE (AS FIRED)	47.70 LB/HR
TOTAL DRY AIR FLOW	2102.26 LB/HR
PERCENT OF MCR LOAD	95.84 PRCT
THEOR EXCESS AIR	10.49 PRCT
BED TEMPERATURE	1498.18 DEG F
CA/S MOLE RATIO	1.76
SUPERFICIAL VELOCITY	6.75 FT/SEC
FREEDBARD VELOCITY	3.61 FT/SEC
ACTIVE BED HEIGHT	37.27 IN
BED PRESSURE GRADIENT	1.00 IN H2O/IN BED
GRID PRESSURE DROP	16.49 IN H2O
BED PRESSURE DROP	37.21 IN H2O
BED TUBES FLOW RATE	32053.69 LB/HR
STEAMING RATE	1351.31 LB/HR
RECYCLE SOLIDS	285.32 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	24.00 LB/HR
BED DRAIN SOLIDS	22.00 LB/HR
CYCLONE EFFICIENCY	92.24 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	47.97	953.45	52.48	36.10	16.39
TEST LOOP NO. 2	37.32	911.86	40.08	23.72	16.36
ECONOMIZER	9.67	1108.30	9.83		
SUPERHEATER	16.91	159.96	19.56		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.33	.340	18.52	176.	431.

NOX EMISSIONS (AS FIRED)	.24 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.83 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	179.52 PPM
SO2 EMISSIONS (AT 3PRCT O2)	438.60 PPM
SULFUR RETENTION	7.38 LB S/HR
SULFUR RETENTION	87.83 PRCT
CALCIUM UTILIZATION	49.96 PRCT
COMBUSTION EFFICIENCY	95.30 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 20 79
 DATA RECORDED AT 10 59 0

STEADY STATE RUN L-32
 MATRIX TEST POINT NO. 56
 WITH RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	177.70 LB/HR
LIME FEED RATE (AS FIRED)	36.90 LB/HR
TOTAL DRY AIR FLOW	1878.74 LB/HR
PERCENT OF MCR LOAD	77.94 PRCT
THEOR EXCESS AIR	21.57 PRCT
BED TEMPERATURE	1445.73 DEG F
CA/S MOLE RATIO	1.79
SUPERFICIAL VELOCITY	5.70 FT/SEC
FREEBOARD VELOCITY	3.03 FT/SEC
ACTIVE BED HEIGHT	37.53 IN
BED PRESSURE GRADIENT	1.09 IN H2O/IN BED
GRID PRESSURE DROP	12.99 IN H2O
BED PRESSURE DROP	40.75 IN H2O
BED TUBES FLOW RATE	31957.69 LB/HR
STEAMING RATE	1174.19 LB/HR
RECYCLE SOLIDS	176.22 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	13.00 LB/HR
BED DRAIN SOLIDS	36.00 LB/HR
CYCLONE EFFICIENCY	93.13 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	47.83	892.11	52.55	37.20	15.35
TEST LOOP NO. 2	36.21	849.42	38.96	23.63	15.33
ECONOMIZER	8.33	963.99	8.46		
SUPERHEATER	15.13	143.91	17.47		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	4.79	.230	15.74	188.	794.

NOX EMISSIONS (AS FIRED)	.28 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.65 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	203.24 PPM
SO2 EMISSIONS (AT 3PRCT O2)	881.81 PPM
SULFUR RETENTION	4.74 LB S/HR
SULFUR RETENTION	74.09 PRCT
CALCIUM UTILIZATION	41.45 PRCT
COMBUSTION EFFICIENCY	96.82 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

DATA RECORDED ON 3 20 79

DATA RECORDED AT 13 27 0

STEADY STATE RUN L-33

MATRIX TEST POINT NO. 55

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	177.70 LB/HR
LIME FEED RATE (AS FIRED)	36.90 LB/HR
TOTAL DRY AIR FLOW	1648.53 LB/HR
PERCENT OF MCR LOAD	76.29 PRCT
THEOR EXCESS AIR	9.43 PRCT
BED TEMPERATURE	1482.07 DEG F
CA/S MOLE RATIO	1.69
SUPERFICIAL VELOCITY	5.22 FT/SEC
FREEBOARD VELOCITY	2.72 FT/SEC
ACTIVE BED HEIGHT	35.44 IN
BED PRESSURE GRADIENT	1.13 IN H2O/IN BED
GRID PRESSURE DROP	7.22 IN H2O
BED PRESSURE DROP	40.20 IN H2O
BED TUBES FLOW RATE	32120.93 LB/HR
STEAMING RATE	1124.75 LB/HR
RECYCLE SOLIDS	156.18 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	11.50 LB/HR
BED DRAIN SOLIDS	16.00 LB/HR
CYCLONE EFFICIENCY	93.14 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	47.57	909.35	52.17	36.05	16.12
TEST LOOP NO. 2	36.85	858.88	39.68	23.58	16.10
ECONOMIZER	7.90	939.65	8.01		
SUPERHEATER	14.33	139.24	16.56		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂ PRCT	CO PRCT	CO ₂ PRCT	NOX PPM	SO ₂ PPM
FURNACE OUTLET	2.16	.400	19.22	150.	495.

NOX EMISSIONS (AS FIRED)	.20 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.94 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	143.50 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	472.45 PPM
SULFUR RETENTION	5.84 LB S/HR
SULFUR RETENTION	86.42 PRCT
CALCIUM UTILIZATION	51.04 PRCT
COMBUSTION EFFICIENCY	96.52 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-34

DATA RECORDED ON 3 20 79

MATRIX TEST POINT NO. 61

DATA RECORDED AT 19 1 30

WITH REC YCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	177.70 LB/HR
LIME FEED RATE (AS FIRED)	36.90 LB/HR
TOTAL DRY AIR FLOW	1620.14 LB/HR
PERCENT OF MCR LOAD	77.36 PRCT
THEOR EXCESS AIR	8.01 PRCT
BED TEMPERATURE	1554.90 DEG F
CA/S MOLE RATIO	1.74
SUPERFICIAL VELOCITY	5.22 FT/SEC
FREEBOARD VELOCITY	2.70 FT/SEC
ACTIVE BED HEIGHT	30.07 IN
BED PRESSURE GRADIENT	.92 IN H2O/IN BED
GRID PRESSURE DROP	10.16 IN H2O
BED PRESSURE DROP	27.55 IN H2O
BED TUBES FLOW RATE	32296.94 LB/HR
STEAMING RATE	1093.51 LB/HR
RECYCLE SOLIDS	213.22 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	17.00 LB/HR
BED DRAIN SOLIDS	26.00 LB/HR
CYCLONE EFFICIENCY	92.62 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	50.07	776.03	55.89	39.00	16.89
TEST LOOP NO. 2	38.63	718.11	42.22	25.34	16.87
ECONOMIZER	8.59	849.31	8.74		
SUPERHEATER	15.35	134.91	17.95		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	2.20	.310	17.48	205.	467.

NOX EMISSIONS (AS FIRED)	.26 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.84 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	195.96 PPM
SO2 EMISSIONS (AT 3PRCT O2)	446.59 PPM
SULFUR RETENTION	5.74 LB S/HR
SULFUR RETENTION	87.36 PRCT
CALCIUM UTILIZATION	50.23 PRCT
COMBUSTION EFFICIENCY	96.35 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-35
MATRIX TET POINT NO. 62
WITH RECYCLE
FREEMAN COAL

DATA RECORDED ON 3 20 79
DATA RECORDED AT 22 24 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	177.70 LB/HR
LIME FEED RATE (AS FIRED)	36.90 LB/HR
TOTAL DRY AIR FLOW	1901.07 LB/HR
PERCENT OF MCR LOAD	77.07 PRCT
THEOR EXCESS AIR	28.41 PRCT
BED TEMPERATURE	1424.77 DEG F
CA/S MOLE RATIO	1.69
SUPERFICIAL VELOCITY	5.63 FT/SEC
FREEBOARD VELOCITY	2.99 FT/SEC
ACTIVE BED HEIGHT	35.67 IN
BED PRESSURE GRADIENT	.97 IN H2O/IN BED
GRID PRESSURE DROP	13.48 IN H2O
BED PRESSURE DROP	34.75 IN H2O
BED TUBES FLOW RATE	32224.40 LB/HR
STEAMING RATE	1099.46 LB/HR
RECYCLE SOLIDS	190.62 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	19.00 LB/HR
BED DRAIN SOLIDS	26.00 LB/HR
CYCLONE EFFICIENCY	90.94 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	49.02	814.92	54.37	39.92	14.45
TEST LOOP NO. 2	38.46	759.32	41.86	27.43	14.44
ECONOMIZER	9.03	886.13	9.19		
SUPERHEATER	15.41	135.94	18.00		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OULET	5.79	.163	13.80	185.	750.

NOX EMISSIONS (AS FIRED)	.28 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.58 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	218.34 PPM
SO2 EMISSIONS (AT 3PRCT O2)	887.57 PPM
SULFUR RETENTION	5.19 LB S/HR
SULFUR RETENTION	76.84 PRCT
CALCIUM UTILIZATION	45.38 PRCT
COMBUSTION EFFICIENCY	96.46 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 21 79
 DATA RECORDED AT 3 42 45

STEADY STATE RUN L-36
 MATRIX TEST POINT NO. 63
 WITH RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	227.25 LB/HR
LIME FEED RATE (AS FIRED)	47.70 LB/HR
TOTAL DRY AIR FLOW	2004.30 LB/HR
PERCENT OF MCR LOAD	94.97 PRCT
THEOR EXCESS AIR	9.19 PRCT
BED TEMPERATURE	1561.73 DEG F
CA/S MOLE RATIO	1.71
SUPERFICIAL VELOCITY	6.43 FT/SEC
FREEBOARD VELOCITY	3.39 FT/SEC
ACTIVE BED HEIGHT	30.55 IN
BED PRESSURE GRADIENT	.99 IN H2O/IN BED
GRID PRESSURE DROP	14.91 IN H2O
BED PRESSURE DROP	30.18 IN H2O
BED TUBES FLOW RATE	32196.69 LB/HR
STEAMING RATE	1340.84 LB/HR
RECYCLE SOLIDS	252.07 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	13.50 LB/HR
BED DRAIN SOLIDS	34.00 LB/HR
CYCLONE EFFICIENCY	94.92 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	51.51	845.63	57.27	39.80	17.47
TEST LOOP NO. 2	40.40	781.84	44.08	26.63	17.45
ECONOMIZER	10.41	1069.76	10.60		
SUPERHEATER	17.84	158.63	20.84		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.21	.270	16.21	250.	377.

NOX EMISSIONS (AS FIRED)	.32 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.68 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	252.98 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	381.34 PPM
SULFUR RETENTION	7.81 LB S/HR
SULFUR RETENTION	90.41 PRCT
CALCIUM UTILIZATION	52.82 PRCT
COMBUSTION EFFICIENCY	97.48 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-37

DATA RECORDED ON 3 21 79

MATRIX TEST POINT NO. 64

DATA RECORDED AT 6 16 30

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	227.25 LB/HR
LIME FEED RATE (AS FIRED)	47.70 LB/HR
TOTAL DRY AIR FLOW	2446.28 LB/HR
PERCENT OF MCR LOAD	89.90 PRCT
THEOR EXCESS AIR	42.10 PRCT
BED TEMPERATURE	1478.77 DEG F
CA/S MOLE RATIO	1.81
SUPERFICIAL VELOCITY	7.47 FT/SEC
FREEBOARD VELOCITY	4.02 FT/SEC
ACTIVE BED HEIGHT	33.14 IN
BED PRESSURE GRADIENT	1.02 IN H2O/IN BED
GRID PRESSURE DROP	22.74 IN H2O
BED PRESSURE DROP	33.71 IN H2O
BED TUBES FLOW RATE	32193.97 LB/HR
STEAMING RATE	1392.36 LB/HR
RECYCLE SOLIDS	291.43 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	28.50 LB/HR
BED DRAIN SOLIDS	44.00 LB/HR
CYCLONE EFFICIENCY	91.09 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	50.82	827.52	56.52	40.86	15.67
TEST LOOP NO. 2	39.81	837.03	43.19	27.56	15.64
ECONOMIZER	11.17	1110.46	11.38		
SUPERHEATER	18.71	163.46	21.93		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	6.65	.085	13.55	251.	386.

NOX EMISSIONS (AS FIRED)	.42 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.90 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	315.29 PPM
SO2 EMISSIONS (AT 3PRCT O2)	484.10 PPM
SULFUR RETENTION	7.14 LB S/HR
SULFUR RETENTION	87.26 PRCT
CALCIUM UTILIZATION	48.30 PRCT
COMBUSTION EFFICIENCY	95.94 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-38

DATA RECORDED ON 3 21 79

MATRIX TEST POINT NO. 59

DATA RECORDED AT 10 20 0

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.62 LB/HR
LIME FEED RATE (AS FIRED)	62.10 LB/HR
TOTAL DRY AIR FLOW	2663.48 LB/HR
PERCENT OF MCR LOAD	124.12 PRCT
THEOR EXCESS AIR	10.68 PRCT
BED TEMPERATURE	1682.43 DEG F
CA/S MOLE RATIO	1.75
SUPERFICIAL VELOCITY	9.01 FT/SEC
FREEBOARD VELOCITY	4.73 FT/SEC
ACTIVE BED HEIGHT	33.98 IN
BED PRESSURE GRADIENT	.91 IN H2O/IN BED
GRID PRESSURE DROP	29.86 IN H2O
BED PRESSURE DROP	30.90 IN H2O
BED TUBES FLOW RATE	31968.08 LB/HR
STEAMING RATE	1744.37 LB/HR
RECYCLE SOLIDS	211.78 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	16.50 LB/HR
BED DRAIN SOLIDS	36.00 LB/HR
CYCLONE EFFICIENCY	92.77 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	53.34	837.85	59.60	39.33	20.27
TEST LOOP NO. 2	44.36	855.26	48.54	28.31	20.23
ECONOMIZER	11.13	1304.87	11.31		
SUPERHEATER	21.71	195.49	25.35		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	3.41	.150	15.48	304.	1525.

NOX EMISSIONS (AS FIRED)	.40 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.77 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	310.94 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1560.32 PPM
SULFUR RETENTION	6.55 LB S/HR
SULFUR RETENTION	59.72 PRCT
CALCIUM UTILIZATION	34.06 PRCT
COMBUSTION EFFICIENCY	98.19 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77.

DATA RECORDED ON 3 21 79

DATA RECORDED AT 13 57 0

STEADY STATE RUN L-39

MATRIX TEST POINT NO. 60

WITH RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.62 LB/HR
LIME FEED RATE (AS FIRED)	62.10 LB/HR
TOTAL DRY AIR FLOW	2885.57 LB/HR
PERCENT OF MCR LOAD	123.64 PRCT
THEOR EXCESS AIR	20.06 PRCT
BED TEMPERATURE	1619.30 DEG F
CA/S MOLE RATIO	1.75
SUPERFICIAL VELOCITY	9.45 FT/SEC
FREEBOARD VELOCITY	5.01 FT/SEC
ACTIVE BED HEIGHT	33.13 IN
BED PRESSURE GRADIENT	.96 IN H2O/IN BED
GRID PRESSURE DROP	35.97 IN H2O
BED PRESSURE DROP	31.78 IN H2O
BED TUBES FLOW RATE	32118.78 LB/HR
STEAMING RATE	1745.95 LB/HR
RECYCLE SOLIDS	207.65 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	31.00 LB/HR
BED DRAIN SOLIDS	21.00 LB/HR
CYCLONE EFFICIENCY	87.01 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	53.64	839.52	59.95	41.24	18.71
TEST LOOP NO. 2	45.32	856.34	49.68	31.00	18.68
ECONOMIZER	11.18	1288.40	11.36		
SUPERHEATER	22.57	195.49	26.53		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.58	.088	13.73	345.	536.

NOX EMISSIONS (AS FIRED)	.49 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.06 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	402.24 PPM
SO2 EMISSIONS (AT 3PRCT O2)	625.48 PPM
SULFUR RETENTION	9.29 LB S/HR
SULFUR RETENTION	84.61 PRCT
CALCIUM UTILIZATION	48.26 PRCT
COMBUSTION EFFICIENCY	97.21 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-40
MATRIX TEST POINT NO. 65
WITH RECYCLE
FREEMANCOAL

DATA RECORDED ON 3 21 79
DATA RECORDED AT 17 14 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.62 LB/HR
LIME FEED RATE (AS FIRED)	62.10 LB/HR
TOTAL DRY AIR FLOW	2705.52 LB/HR
PERCENT OF MCR LOAD	124.29 PRCT
THEOR EXCESS AIR	15.83 PRCT
BED TEMPERATURE	1644.93 DEG F
CA/S MOLE RATIO	1.80
SUPERFICIAL VELOCITY	9.01 FT/SEC
FREEBOARD VELOCITY	4.79 FT/SEC
ACTIVE BED HEIGHT	30.71 IN
BED PRESSURE GRADIENT	.88 IN H2O/IN BED
GRID PRESSURE DROP	32.43 IN H2O
BED PRESSURE DROP	27.00 IN H2O
BED TUBES FLOW RATE	32013.78 LB/HR
STEAMING RATE	1721.54 LB/HR
RECYCLE SOLIDS	203.71 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	64.50 LB/HR
BED DRAIN SOLIDS	36.00 LB/HR
CYCLONE EFFICIENCY	75.95 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	54.50	807.25	61.25	42.10	19.15
TEST LOOP NO. 2	46.71	822.43	51.50	32.38	19.12
ECONOMIZER	11.16	1245.33	11.35		
SUPERHEATER	22.49	193.76	26.46		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	3.99	.230	15.37	316.	906.

NOX EMISSIONS (AS FIRED)	.42 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.68 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	334.50 PPM
SO2 EMISSIONS (AT 3PRCT O2)	958.45 PPM
SULFUR RETENTION	7.99 LB S/HR
SULFUR RETENTION	74.86 PRCT
CALCIUM UTILIZATION	41.54 PRCT
COMBUSTION EFFICIENCY	94.33 PRCT

PRELIMINARY SSU DATA ANALYSIS

STEADY STATE RUN L-41
MATRIX TEST POINT NO. 66
WITH RECYCLE
FREEMAN COAL

PROGRAM VERSION: SSU77
DATA RECORDED ON 8 21 79
DATA RECORDED AT 19 13 15

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.62 LB/HR
LIME FEED RATE (AS FIRED)	62.10 LB/HR
TOTAL DRY AIR FLOW	3051.48 LB/HR
PERCENT OF MCR LOAD	127.51 PRCT
THEOR EXCESS AIR	23.34 PRCT
BED TEMPERATURE	1628.27 DEG F
CA/S MOLE RATIO	1.80
SUPERFICIAL VELOCITY	10.06 FT/SEC
FREEBOARD VELOCITY	5.37 FT/SEC
ACTIVE BED HEIGHT	32.03 IN
BED PRESSURE GRADIENT	.92 IN H2O/IN BED
GRID PRESSURE DROP	39.89 IN H2O
BED PRESSURE DROP	29.55 IN H2O
BED TUBES FLOW RATE	32116.16 LB/HR
STEAMING RATE	1781.32 LB/HR
RECYCLE SOLIDS	207.09 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	49.00 LB/HR
BED DRAIN SOLIDS	38.00 LB/HR
CYCLONE EFFICIENCY	80.87 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	54.30	809.37	60.97	42.21	18.76
TEST LOOP NO. 2	46.33	824.31	51.04	32.31	18.73
ECONOMIZER	11.67	1293.53	11.87		
SUPERHEATER	23.68	199.20	27.99		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	5.56	.100	14.14	342.	577.

NOX EMISSIONS (AS FIRED)	.50 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	1.18 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	398.34 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	672.45 PPM
SULFUR RETENTION	8.75 LB S/HR
SULFUR RETENTION	81.90 PRCT
CALCIUM UTILIZATION	45.45 PRCT
COMBUSTION EFFICIENCY	96.31 PRCT

PRELIMINARY SSU DATA ANALYSIS
 STEADY STATE RUN L-42
 MATRIX TEST POINT NO. 36 (REPEAT)
 WITH RECYCLE
 FREEMAN COAL

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 21 79
 DATA RECORDED AT 21 32 0

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	276.62 LB/HR
LIME FEED RATE (AS FIRED)	125.10 LB/HR
TOTAL DRY AIR FLOW	3040.25 LB/HR
PERCENT OF MCR LOAD	128.32 PRCT
THEOR EXCESS AIR	23.64 PRCT
BED TEMPERATURE	1621.53 DEG F
CA/S MOLE RATIO	3.53
SUPERFICIAL VELOCITY	10.03 FT/SEC
FREEBOARD VELOCITY	5.37 FT/SEC
ACTIVE BED HEIGHT	32.23 IN
BED PRESSURE GRADIENT	.88 IN H2O/IN BED
GRID PRESSURE DROP	40.35 IN H2O
BED PRESSURE DROP	28.50 IN H2O
BED TUBES FLOW RATE	32007.21 LB/HR
STEAMING RATE	1766.87 LB/HR
RECYCLE SOLIDS	213.00 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	48.00 LB/HR
BED DRAIN SOLIDS	79.00 LB/HR
CYCLONE EFFICIENCY	81.61 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	53.86	806.10	60.44	41.86	18.58
TEST LOOP NO. 2	45.90	820.08	50.53	31.98	18.55
ECONOMIZER	11.66	1286.49	11.86		
SUPERHEATER	23.42	197.81	27.66		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	5.19	.080	14.96	367.	102.

NOX EMISSIONS (AS FIRED)	.53 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	.21 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	417.59 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	115.52 PPM
SULFUR RETENTION	10.63 LB S/HR
SULFUR RETENTION	96.90 PRCT
CALCIUM UTILIZATION	27.43 PRCT
COMBUSTION EFFICIENCY	95.82 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 22 79
 DATA RECORDED AT 1 9 0

STEADY STATE RUN L-43
 MATRIX TEST POINT NO. 35 (REPEAT)
 WITH RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.62 LB/HR
LIME FEED RATE (AS FIRED)	125.10 LB/HR
TOTAL DRY AIR FLOW	2733.34 LB/HR
PERCENT OF MCR LOAD	127.03 PRCT
THEOR EXCESS AIR	7.47 PRCT
BED TEMPERATURE	1598.03 DEG F
CA/S MOLE RATIO	3.44
SUPERFICIAL VELOCITY	9.00 FT/SEC
FREEBOARD VELOCITY	4.81 FT/SEC
ACTIVE BED HEIGHT	35.25 IN
BED PRESSURE GRADIENT	.78 IN H2O/IN BED
GRID PRESSURE DROP	32.99 IN H2O
BED PRESSURE DROP	27.56 IN H2O
BED TUBES FLOW RATE	32009.95 LB/HR
STEAMING RATE	1719.96 LB/HR
RECYCLE SOLIDS	195.65 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	24.00 LB/HR
BED DRAIN SOLIDS	46.00 LB/HR
CYCLONE EFFICIENCY	89.07 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO (CONV)	HO (RAD)
TEST LOOP NO. 1	56.41	847.71	63.38	45.22	18.17
TEST LOOP NO. 2	49.43	859.29	54.65	36.50	18.14
ECONOMIZER	11.31	1269.87	11.50		
SUPERHEATER	23.25	193.40	27.52		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.53	.175	16.29	314.	270.

NOX EMISSIONS (AS FIRED)	.41 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.50 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	323.17 PPM
SO2 EMISSIONS (AT 3PRCT O2)	278.15 PPM
SULFUR RETENTION	10.46 LB S/HR
SULFUR RETENTION	92.80 PRCT
CALCIUM UTILIZATION	26.98 PRCT
COMBUSTION EFFICIENCY	97.53 PRCT

PRELIMINARY SSU DATA ANALYSIS
 STEADY STATE RUN L-44
 MATRIX TEST POINT NO. 30 (REPEAT)
 WITH RECYCLE
 FREEMAN COAL

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 22 79
 DATA RECORDED AT 4 59 30

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.62 LB/HR
LIME FEED RATE (AS FIRED)	125.10 LB/HR
TOTAL DRY AIR FLOW	2895.33 LB/HR
PERCENT OF MCR LOAD	126.55 PRCT
THEOR EXCESS AIR	14.41 PRCT
BED TEMPERATURE	1443.40 DEG F
CA/S MOLE RATIO	3.53
SUPERFICIAL VELOCITY	8.85 FT/SEC
FREEBOARD VELOCITY	4.85 FT/SEC
ACTIVE BED HEIGHT	42.80 IN
BED PRESSURE GRADIENT	.92 IN H2O/IN BED
GRID PRESSURE DROP	34.40 IN H2O
BED PRESSURE DROP	39.18 IN H2O
BED TUBES FLOW RATE	31844.62 LB/HR
STEAMING RATE	1635.42 LB/HR
RECYCLE SOLIDS	142.48 LB/HR
RECYCLE BYPASS SOLIDS	0.00 LB/HR
BAGHOUSE SOLIDS	24.00 LB/HR
BED DRAIN SOLIDS	40.00 LB/HR
CYCLONE EFFICIENCY	85.58 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	52.08	840.53	58.01	43.23	14.78
TEST LOOP NO. 2	43.72	850.14	47.78	33.03	14.76
ECONOMIZER	10.56	1183.08	10.74		
SUPERHEATER	25.62	186.20	31.15		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	6.58	.165	13.96	214.	340.

NOX EMISSIONS (AS FIRED)	.30 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.67 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	267.46 PPM
SO2 EMISSIONS (AT 3PRCT O2)	424.34 PPM
SULFUR RETENTION	9.88 LB S/HR
SULFUR RETENTION	90.05 PRCT
CALCIUM UTILIZATION	25.49 PRCT
COMBUSTION EFFICIENCY	96.65 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 22 79
 DATA RECORDED AT 10 15 0

STEADY STATE RUN L-45
 MATRIX TEST POINT NO. 84
 NO RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	296.62 LB/HR
LIME FEED RATE (AS FIRED)	62.10 LB/HR
TOTAL DRY AIR FLOW	3012.72 LB/HR
PERCENT OF MCR LOAD	125.58 PRCT
THEOR EXCESS AIR	22.18 PRCT
BED TEMPERATURE	1659.93 DEG F
CA/S MOLE RATIO	1.71
SUPERFICIAL VELOCITY	10.07 FT/SEC
FREEBOARD VELOCITY	5.28 FT/SEC
ACTIVE BED HEIGHT	35.02 IN
BED PRESSURE GRADIENT	.80 IN H2O/IN BED
GRID PRESSURE DROP	40.22 IN H2O
BED PRESSURE DROP	27.91 IN H2O
BED TUBES FLOW RATE	32070.75 LB/HR
STEAMING RATE	1711.36 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	52.00 LB/HR
BAGHOUSE SOLIDS	5.00 LB/HR
BED DRAIN SOLIDS	35.00 LB/HR
CYCLONE EFFICIENCY	91.23 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	53.08	864.89	59.12	39.54	19.58
TEST LOOP NO. 2	46.20	876.13	50.66	31.10	19.55
ECONOMIZER	10.35	1248.65	10.51		
SUPERHEATER	22.59	192.43	26.63		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CU2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	6.09	.060	13.25	362.	665.

NOX EMISSIONS (AS FIRED)	.53 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	1.36 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	436.90 PPM
SO2 EMISSIONS (AT 3PRCT O2)	802.82 PPM
SULFUR RETENTION	9.08 LB S/HR
SULFUR RETENTION	80.58 PRCT
CALCIUM UTILIZATION	47.20 PRCT
COMBUSTION EFFICIENCY	94.56 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-46

DATA RECORDED ON 3 22 79

MATRIX TEST POINT NO. 82

DATA RECORDED AT 14 28 0

NO RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	227.25 LB/HR
LIME FEED RATE (AS FIRED)	47.70 LB/HR
TOTAL DRY AIR FLOW	2381.57 LB/HR
PERCENT OF MCR LOAD	92.99 PRCT
THEOR EXCESS AIR	32.26 PRCT
BED TEMPERATURE	1648.77 DEG F
CA/S MOLE RATIO	1.81
SUPERFICIAL VELOCITY	7.84 FT/SEC
FREEBOARD VELOCITY	3.93 FT/SEC
ACTIVE BED HEIGHT	30.81 IN
BED PRESSURE GRADIENT	.92 IN H2O/IN BED
GRID PRESSURE DROP	23.82 IN H2O
BED PRESSURE DROP	28.38 IN H2O
BED TUBES FLOW RATE	32261.74 LB/HR
STEAMING RATE	1362.73 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	38.00 LB/HR
BAGHOUSE SOLIDS	5.50 LB/HR
BED DRAIN SOLIDS	25.00 LB/HR
CYCLONE EFFICIENCY	87.36 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	53.08	837.46	59.27	40.05	19.22
TEST LOOP NO. 2	47.27	860.75	52.02	32.82	19.20
ECONOMIZER	8.12	1002.07	8.24		
SUPERHEATER	15.99	162.31	18.30		

DRY STACK GAS STREAM COMPOSITIONS

	O ₂	CO	CO ₂	NOX	SO ₂
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	5.54	.065	13.34	334.	883.

NOX EMISSIONS (AS FIRED)	.52 LB NOX/MMBTU
SO ₂ EMISSIONS (AS FIRED)	1.91 LB SO ₂ /MMBTU
NOX EMISSIONS (AT 3PRCT O ₂)	389.22 PPM
SO ₂ EMISSIONS (AT 3PRCT O ₂)	1027.49 PPM
SULFUR RETENTION	5.90 LB S/HR
SULFUR RETENTION	72.09 PRCT
CALCIUM UTILIZATION	39.90 PRCT
COMBUSTION EFFICIENCY	96.42 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 22 79
 DATA RECORDED AT 19 28 0

STEADY STATE RUN L-47
 MATRIX TEST POINT NO. 81
 NO RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	227.25 LB/HR
LIME FEED RATE (AS FIRED)	47.70 LB/HR
TOTAL DRY AIR FLOW	2083.79 LB/HR
PERCENT OF MCR LOAD	95.10 PRCT
THEOR EXCESS AIR	10.44 PRCT
BED TEMPERATURE	1642.60 DEG F
CA/S MOLE RATIO	1.81
SUPERFICIAL VELOCITY	6.91 FT/SEC
FREEBOARD VELOCITY	3.46 FT/SEC
ACTIVE BED HEIGHT	33.39 IN
BED PRESSURE GRADIENT	.95 IN H2O/IN BED
GRID PRESSURE DROP	16.28 IN H2O
BED PRESSURE DROP	31.59 IN H2O
BED TUBES FLOW RATE	32200.59 LB/HR
STEAMING RATE	1396.23 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	27.00 LB/HR
BAGHOUSE SOLIDS	6.50 LB/HR
BED DRAIN SOLIDS	30.00 LB/HR
CYCLONE EFFICIENCY	80.60 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	54.04	995.25	59.66	40.03	19.63
TEST LOOP NO. 2	48.49	989.40	52.98	33.37	19.62
ECONOMIZER	7.59	1085.47	7.68		
SUPERHEATER	14.95	166.37	16.90		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	3.65	.105	14.74	262.	1102.

NOX EMISSIONS (AS FIRED)	.35 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	2.03 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	271.26 PPM
SO2 EMISSIONS (AT 3PRCT O2)	1143.12 PPM
SULFUR RETENTION	5.70 LB S/HR
SULFUR RETENTION	69.67 PRCT
CALCIUM UTILIZATION	38.56 PRCT
COMBUSTION EFFICIENCY	94.66 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77
 DATA RECORDED ON 3 22 79
 DATA RECORDED AT 22 1 0

STEADY STATE RUN L-48
 MATRIX TEST POINT NO. 80
 NO RECYCLE
 FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	177.70 LB/HR
LIME FEED RATE (AS FIRED)	36.90 LB/HR
TOTAL DRY AIR FLOW	1891.10 LB/HR
PERCENT OF MCR LOAD	73.49 PRCT
THEOR EXCESS AIR	30.70 PRCT
BED TEMPERATURE	1544.93 DEG F
CA/S MOLE RATIO	1.84
SUPERFICIAL VELOCITY	5.91 FT/SEC
FREEBOARD VELOCITY	2.92 FT/SEC
ACTIVE BED HEIGHT	35.10 IN
BED PRESSURE GRADIENT	.85 IN H2O/IN BED
GRID PRESSURE DROP	16.01 IN H2O
BED PRESSURE DROP	29.99 IN H2O
BED TUBES FLOW RATE	32192.37 LB/HR
STEAMING RATE	1148.54 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	20.00 LB/HR
BAGHOUSE SOLIDS	13.50 LB/HR
BED DRAIN SOLIDS	8.00 LB/HR
CYCLONE EFFICIENCY	59.70 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	52.48	893.41	58.21	40.81	17.40
TEST LOOP NO. 2	46.62	919.66	51.00	33.62	17.38
ECONOMIZER	6.73	934.58	6.81		
SUPERHEATER	12.62	143.36	14.21		

DRY STACK GAS STREAM COMPOSITIONS

	O2 PRCT	CO PRCT	CO2 PRCT	NOX PPM	SO2 PPM
FURNACE OUTLET	5.44	.070	13.28	286.	342.

NOX EMISSIONS (AS FIRED)	.44 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.74 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	330.86 PPM
SO2 EMISSIONS (AT 3PRCT O2)	394.92 PPM
SULFUR RETENTION	5.52 LB S/HR
SULFUR RETENTION	88.75 PRCT
CALCIUM UTILIZATION	48.28 PRCT
COMBUSTION EFFICIENCY	92.96 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-49

DATA RECORDED ON 3 23 79

MATRIX TEST POINT NO. 79

DATA RECORDED AT 1 3 45

NO RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	187.85 LB/HR
LIME FEED RATE (AS FIRED)	36.90 LB/HR
TOTAL DRY AIR FLOW	1647.94 LB/HR
PERCENT OF MCR LOAD	76.77 PRCT
THEOR EXCESS AIR	12.13 PRCT
BED TEMPERATURE	1527.53 DEG F
CA/S MOLE RATIO	1.74
SUPERFICIAL VELOCITY	5.24 FT/SEC
FREEBOARD VELOCITY	2.62 FT/SEC
ACTIVE BED HEIGHT	34.33 IN
BED PRESSURE GRADIENT	1.18 IN H2O/IN BED
GRID PRESSURE DROP	7.54 IN H2O
BED PRESSURE DROP	40.58 IN H2O
BED TUBES FLOW RATE	32327.89 LB/HR
STEAMING RATE	1148.28 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	25.00 LB/HR
BAGHOUSE SOLIDS	9.50 LB/HR
BED DRAIN SOLIDS	14.00 LB/HR
CYCLONE EFFICIENCY	72.46 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT2 DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	51.72	897.60	57.27	40.26	17.00
TEST LOOP NO. 2	45.30	924.11	49.40	32.42	16.98
ECONOMIZER	6.40	921.17	6.48		
SUPERHEATER	12.91	143.20	14.59		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	2.67	.255	16.80	170.	474.

NOX EMISSIONS (AS FIRED)	.22 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.87 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	167.14 PPM
SO2 EMISSIONS (AT 3PRCT O2)	465.47 PPM
SULFUR RETENTION	5.72 LB S/HR
SULFUR RETENTION	86.98 PRCT
CALCIUM UTILIZATION	50.01 PRCT
COMBUSTION EFFICIENCY	91.44 PRCT

PRELIMINARY SSU DATA ANALYSIS

PROGRAM VERSION: SSU77

STEADY STATE RUN L-50

DATA RECORDED ON 3 23 79

BASELINE TEST POINT

DATA RECORDED AT 11 38 0

NO RECYCLE

FREEMAN COAL

- SUMMARY OF OPERATING CONDITIONS -

COAL FEED RATE (AS FIRED)	247.07 LB/HR
LIME FEED RATE (AS FIRED)	104.40 LB/HR
TOTAL DRY AIR FLOW	2449.72 LB/HR
PERCENT OF MCR LOAD	103.52 PRCT
THEOR EXCESS AIR	22.87 PRCT
BED TEMPERATURE	1509.85 DEG F
CA/S MOLE RATIO	3.64
SUPERFICIAL VELOCITY	7.70 FT/SEC
FREEBOARD VELOCITY	4.05 FT/SEC
ACTIVE BED HEIGHT	41.02 IN
BED PRESSURE GRADIENT	.89 IN H2O/IN BED
GRID PRESSURE DROP	24.18 IN H2O
BED PRESSURE DROP	36.53 IN H2O
BED TUBES FLOW RATE	32089.77 LB/HR
STEAMING RATE	1453.98 LB/HR
RECYCLE SOLIDS	0.00 LB/HR
RECYCLE BYPASS SOLIDS	51.50 LB/HR
BAGHOUSE SOLIDS	7.00 LB/HR
BED DRAIN SOLIDS	72.00 LB/HR
CYCLONE EFFICIENCY	88.03 PRCT

- SUMMARY OF STEADY STATE TEST RESULTS -

HEAT TRANSFER COEFFICIENTS - BTU/HR FT² DEG F

	UO	HI	HO	HO(CONV)	HO(RAD)
TEST LOOP NO. 1	52.00	919.26	57.51	40.94	16.57
TEST LOOP NO. 2	44.02	943.43	47.83	31.28	16.55
ECONOMIZER	8.72	1131.63	8.84		
SUPERHEATER	18.55	170.27	21.57		

DRY STACK GAS STREAM COMPOSITIONS

	O2	CO	CO2	NOX	SO2
	PRCT	PRCT	PRCT	PPM	PPM
FURNACE OUTLET	5.78	.070	14.83	288.	87.

NOX EMISSIONS (AS FIRED)	.42 LB NOX/MMBTU
SO2 EMISSIONS (AS FIRED)	.18 LB SO2/MMBTU
NOX EMISSIONS (AT 3PRCT O2)	340.96 PPM
SO2 EMISSIONS (AT 3PRCT O2)	102.30 PPM
SULFUR RETENTION	8.66 LB S/HR
SULFUR RETENTION	97.36 PRCT
CALCIUM UTILIZATION	26.77 PRCT
COMBUSTION EFFICIENCY	92.57 PRCT